CASE REPORT

Michael I. Schaffer,[1] *Ph.D.; Reng-Lang Lin,*[1] *Ph.D.;*
Nancy B. Wu Chen,[1] *Ph.D.; Carole Trojan,*[1] *B.S.;*
Shaku Teas,[1] *M.D.; and Robert J. Stein,*[1] *M.D.*

Spontaneous Live Birth with a Maternal History of Intravenous Use of Pentazocine and Tripelennamine (T's and Blues)

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ABSTRACT: A 24-year-old black female presented a live birth of six-months gestation. The 700-g neonate survived for 11 h. After toxicology revealed the presence of pentazocine and tripelennamine (T's and Blues), the mother admitted to using this combination intravenously 9 h previous to admission. Concentrations of pentazocine and tripelennamine were simultaneously determined by gas-liquid chromatography (GLC) combined with nitrogen selective detection. Analyses were performed on a 3% OV-101 column, with the added internal standard, dexbrompheniramine. Both pentazocine and tripelennamine were qualitatively confirmed by their electron impact mass spectra. Concentrations of pentazocine and tripelennamine in various fluids and tissues were determined.

KEYWORDS: toxicology, pentazocine, tripelennamine, "T's and Blues," chromatographic analyses, spontaneous live birth

Pentazocine was initially introduced as an opioid analgesic with little or no abuse potential [*1-15*]. It was not until 1977 that heroin addicts began using the intravenous combination of pentazocine and the antihistamine tripelennamine (T's and Blues) as a substitute for heroin [*16-23*]. In this report we review a fatal case that occurred as a result of the intravenous use of T's and Blues by an expectant mother.

Case Report

A 24-week, 700-g neonate was prematurely delivered. The mother received no prenatal care. She was gravida III, para 1, ab 1. Initial respirations of the neonate were irregular; the

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[1]Chief toxicologist, assistant chief toxicologist, GC/MS section chief, toxicologist I, deputy medical examiner, and the medical examiner, respectively, Cook County Institute of Forensic Medicine, Office of the Medical Examiner, Chicago, IL.

cry was weak and the muscle tone flaccid. The Apgar score was 3 at both 1 and 5 min after delivery. Because of the maternal history of drug abuse the neonate was brought into the institute for examination.

Postmortem Findings

No abnormalities were noted on external examination. The heart was of normal size and shape. The larynx and trachea appeared to be unremarkable. The liver and spleen were of normal size and shape. The kidneys demonstrated marked fetal lobulation, while the urinary bladder was markedly distended. The muscles appeared pale and quite undeveloped. The anterior and posterior fontanelle were markedly open. The entire skull was very soft. The brain did not show any sulci or gyri and fell apart easily.

Materials and Methods

Extraction Procedure

Two millilitres of blood, bile, urine, or 50% tissue homogenate were spiked with 20 μL of the internal standard dexbrompheniramine (100 mg/L) made basic with 1.0 mL of pH 9.5 carbonate/bicarbonate buffer (1.0*M*) and then extracted with 10 mL of ethyl acetate. After centrifugation the ethyl acetate was pipetted into a clean glass culture tube. Two millilitres of 1.0*N* sulfuric acid was added and the mixture was shaken on an Eberback horizontal shaker for 5 min. After centrifugation the solvent layer was aspirated and the aqueous layer was transferred to a clean glass culture tube. The acid was then made basic with the addition of 2.0 mL of pH 9.5 carbonate/bicarbonate buffer (1.0*M*) and 200 μL of concentrated ammonium hydroxide and then extracted with 10 mL of chloroform. After centrifugation the solvent was transferred to a clean concentrator cup and evaporated to dryness on a Brinkman concentrator at 50°C with the aid of a gentle stream of nitrogen.

Gas Chromatography

A computerized Hewlett-Packard 5840A gas chromatograph (GC) equipped with a nitrogen-phosphorus detector (NPD) was used for the GC analyses. The 1.8-m (6-ft) by 2-mm inner diameter glass column was packed with 3% OV-101 on Chromosorb W HP 80-100 mesh (Hewlett-Packard, Avondale, PA). The GC conditions were as follows: column temperature, 220°C isothermal; injector and detector temperatures, 275°C; and nitrogen carrier gas flow rate, 30 mL/min. After extraction and evaporation of solvent, the dry residue was dissolved in 20 μL of ethyl acetate, and 1.0 μL was injected into the GC. Quantitation was based upon peak area ratios of pentazocine and tripelennamine, to the internal standard, dexbrompheniramine. The detector response was studied and found to be linear ($r = 0.99$) for both pentazocine and tripelennamine over the range of 0.5 to 10 mg/L. All specimens were properly diluted to fall within this range. Relative retention times for the GC conditions described above were as follows: tripelennamine (0.80 min.), dexbrompheniramine (1.11 min.), and pentazocine (1.78 min).

Gas Chromatograph/Mass Spectrometer

A Finnigan 3200 gas chromatograph/mass spectrometer (GC/MS) with an Incos 2300 data system was used for all the GC/MS analyses. The carrier gas was helium (20 mL/min.). The mass spectrometer was operating at 70 eV in the electron impact (EI) mode. Enhanced mass spectra (background substracted mass spectra) were obtained for each of the peaks seen in the GC analyses.

Results and Discussion

The abuse of pentazocine or tripelennamine or both, as well as considerations of addiction liability, have appeared in the recent literature [*1-23*]. Withdrawal symptoms in a neonate [*24*] as well as reports of fetal growth failure [*25*] have also appeared. The toxicology findings of T's and Blues in this 24-week-old neonate, confirmed the fact that these chemicals did in fact cross the placental barrier. The concentration found in blood would be indicative of reported overdose cases demonstrated by this office [*26*]. The physiological response to this combination of drugs by the fetus or infant would vary greatly with age [*27*], the most important considerations being the intensity of the respiratory depression and the inability to metabolize these two chemicals [*27*]. Both external and internal examinations failed to reveal any gross congenital anomalies or deformities.

A chromatogram obtained under the experimental conditions described in the Methods Section is shown in Fig. 1. The concentrations of pentazocine and tripelennamine were determined by GC and qualitatively confirmed by GC/MS. Table 1 describes the tissue distribu-

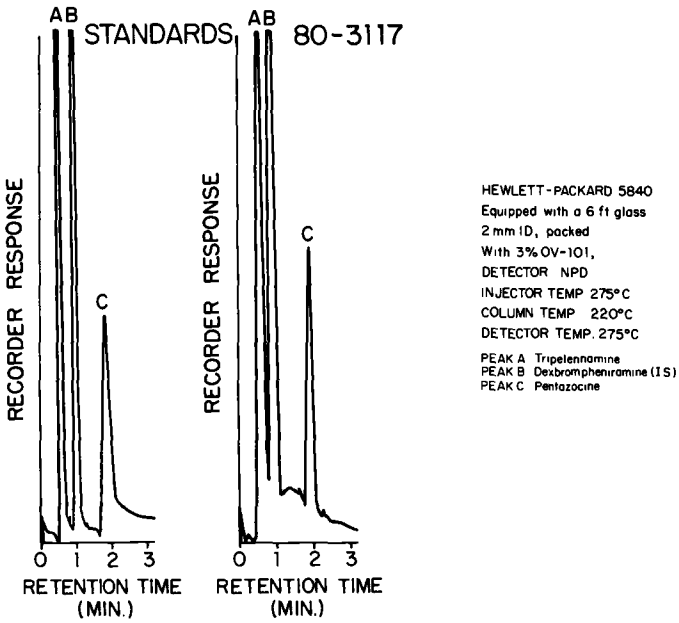

FIG. 1—*Gas chromatograms of standard mixture of tripelennamine, dexbrompheniramine (internal standard), pentazocine, and basic drug extract of urine (80-3117).*

TABLE—*Distribution of pentazocine and tripelennamine.*[a]

Specimen	Pentazocine	Tripelennamine
Blood	1.7	0.5
Urine	5.2	1.4
Liver	3.6	1.4
Kidney	3.6	1.5
Brain	1.6	0.8

[a]Concentrations are mg/L or mg/kg.

tion in all specimens received in toxicology. Figure 2 shows the mass chromatograms of the standard mixture and that obtained from the basic extract of the urine sample. Mass chromatogram at *m/z* 58 indicated the base peak of tripelennamine. Mass chromatogram at *m/z* 247 indicated the base peak of dexbrompheniramine (internal standard). Mass time, extraction characteristics, and mass spectrum of pentazocine standard (Scan 67) were consistent with that of Scan 66 (Fig. 2). An enhanced mass spectrum of Scan 13 showed a base peak at *m/z* 58 (Fig. 4). The retention times, extraction characteristics, and mass spectrum of the tripelennamine standard were consistent with that of Scan 13 (Fig. 2).

The GC/MS identification was also performed on blood, liver, kidney, and brain. The concentration of pentazocine was greatest in urine (5.2 mg/L), while tripelennamine concen-

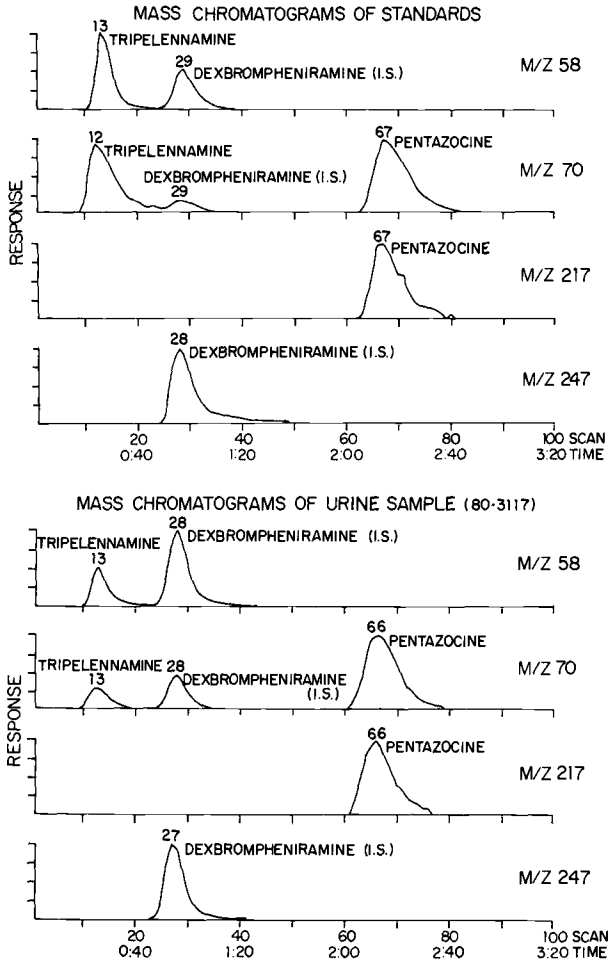

FIG. 2—*Mass chromatograms of standard mixture of tripelennamine, dexbrompheniramine (internal standard), pentazocine, and basic drug extract of urine (80-3117).*

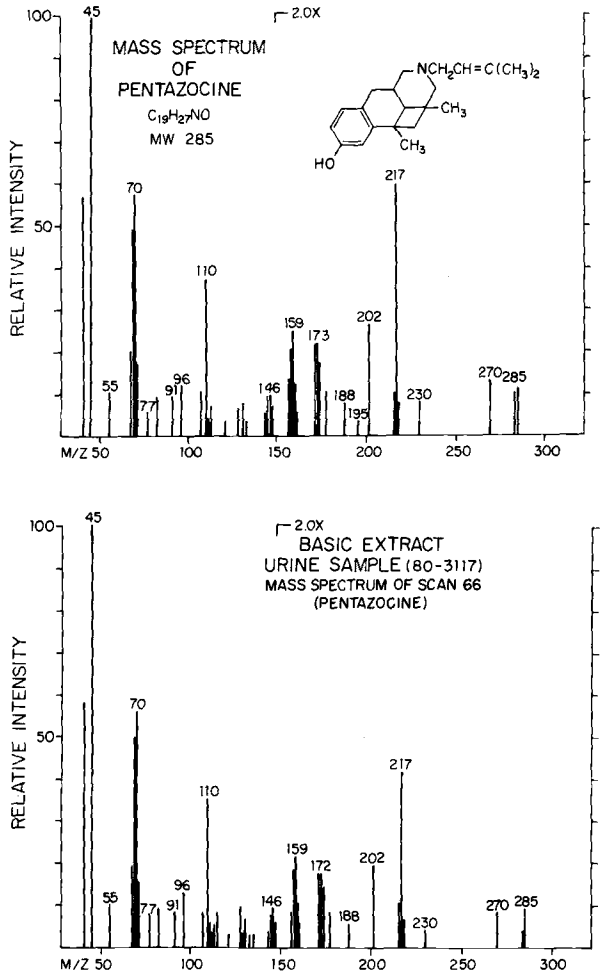

FIG. 3—*Electron impact mass spectra of (Scan 67) pentazocine standard and basic drug extract of urine (80-3117).*

trations were comparable in kidney, liver, or urine. A review of the literature failed to reveal any previous reports of neonatal fatalities as a result of T's and Blues. This was, therefore, the first fatal case reported.

From the toxicology data, the pathologist indicated that this death was directly related to pentazocine and tripelennamine intoxication, the manner of death being accidental. It is certainly significant to note that the infant only weighed 700 g at birth. Was the death entirely a result of the infant's underdevelopment at birth? Perhaps the mother's intravenous use of T's and Blues precipitated the spontaneous delivery that resulted in the ensuing death? The conclusion reached after all the findings were reviewed was that the recent use of intravenous T's and Blues by the mother compromised the fetus resulting in the spontaneous delivery and subsequent death.

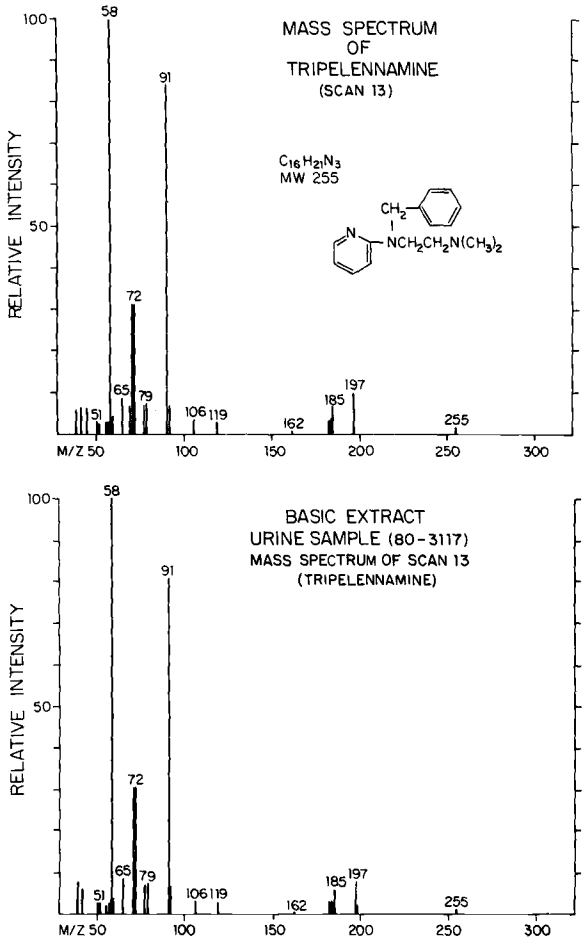

FIG. 4—*Electron impact mass spectra (Scan 13) of tripelennamine standard and basic drug extract of urine (80-3117).*

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Address requests for reprints or additional information to
Michael I. Schaffer, Ph.D.
Chief Toxicologist
Cook County Office of the Medical Examiner
1828 W. Polk St.
Chicago, IL 60612