Phencyclidine-Induced Multi-Organ Failure

Gideon Y. Stein MD[1], Zinaida Fradin MD[1], Yaacov Ori MD[2], Pierre Singer MD[3], Yuri Korobko MD[1] and Aliza Zeidman MD[1]

[1]Department of Internal Medicine B and [2]Institute of Nephrology, Rabin Medical Center (Golda Hasharon Campus), Petah Tiqva, Israel
[3]General Intensive Care Unit, Rabin Medical Center (Beilinson Campus), Petah Tiqva, Israel
Affiliated to Sackler Faculty of Medicine, Tel Aviv University, Ramat Aviv, Israel

Key words: phencyclidine, multi-organ failure, opiates, rhabdomyolysis, molecular adsorbents recirculation system

IMAJ 2005;7:535–537

Phencyclidine intoxication has variable presentations ranging from combative behavior to coma. Despite it being a common street drug, intoxication mortality is quite low [1,2]. Severe PCP intoxication is a therapeutic challenge, mainly in multi-organ failure, since the users are not always aware of the presence of PCP and there is no antidote in the event of intoxication. We present the case of a 42 year old woman with lethargy, circular nystagmus and extreme bradycardia. Laboratory evaluation revealed severe metabolic and respiratory acidosis, acute renal failure, rhabdomyolysis and severe acute hepatic failure. Urine toxic screen was positive for opiates and PCP. This is the first documented case of PCP exposure in Israel.

Patient Description

A 42 year old woman was admitted to the emergency room with confusion and bradycardia of 20 beats per minute. She was an immigrant from the former Soviet Union, divorced with two children, and her past medical history was unremarkable, with no previous illness recorded. According to her boyfriend, they were at a party 30 hours earlier and drank about 300 ml of vodka. She later passed out for more than 24 hours and was brought to the emergency department after she failed to wake up. Her boyfriend denies use of drugs or medications other than non-steroidal anti-inflammatory drugs and serotonin-selective reuptake inhibitors, which she took occasionally but had not taken recently.

On physical examination, the patient looked well nourished and no needle pricks or signs of trauma were found. She was disoriented and only partially responsive to verbal stimuli, without dyspnea or shortness of breath. Temperature was normal (36.7°C rectal), a strong pulse of 20 beats/min was palpated in radial, femoral and carotid arteries, but blood pressure could not be measured at that time due to bradycardia. Her pupils were dilated and partially responsive to light, with circular nystagmus. The rest of the physical examination was remarkable only for vaginal bleeding.

Blood glucose was 40 mg/dl. Blood chemistry, blood gases and prothrombin time values along with urine culture were sent for analysis. Toxicologic screening was also performed. Electrocardiogram showed complexes with wide QRS and peeked T-waves, without P-waves [Figure]. Two intravenous lines and a urinary catheter were inserted; 50 ml of clear but concentrated urine were collected and urine culture was drawn. Intravenous bolus of glucose 50% 50 ml followed by glucose 10% was given immediately and continuously with no response. The pattern of the ECG complex and bradycardia and olyguria was suspicious for hyperkalemia and was treated immediately with intravenous calcium gluconate, adrenalin, atropine and bicarbonate, together with intravenous glucose + insulin and ventolin inhalations.

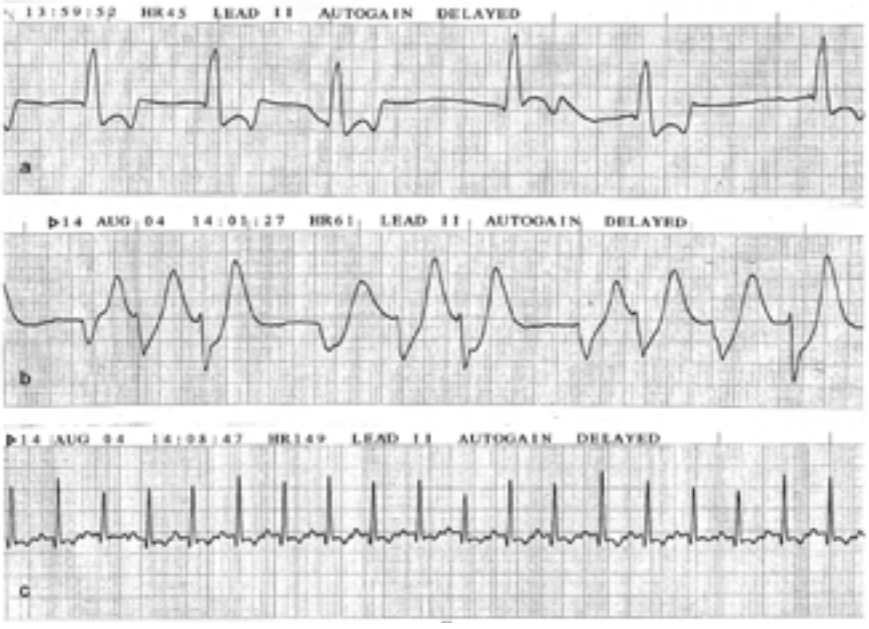

Figure. ECG reading during resuscitation. **[A]** A few minutes after admission, just after the first dose of atropine and adrenalin. **[B]** One minute later, peak T waves are seen indicating hyperkalemia. **[C]** After treatment with calcium, insulin + glucose and bicarbonate, sinus tachycardia is established

PCP = phencyclidine

Within 10 minutes, the patient stabilized hemodynamically (140 beats/min with blood pressure 130/70) but with persistent hypoglycemia. At that point she even woke up for a few minutes but quickly slipped back into partial consciousness. Laboratory results showed severe metabolic and respiratory acidosis, with blood pH of 6.94 (normal 7.35–7.45), HCO_3 10.6 mEq/L (normal 22–26 mEq/L), pCO_2 76.2 mmHg (normal 35–45 mmHg), pO_2 76.8 mmHg (normal 80–90 mmHg) and base excess 18.9 mEq/L (normal -2–2 mEq/L); severe hyperkalemia 9.35 mEq/L (normal 3.5–5.1 mEq/L), hypoglycemia 17 mg/dl (normal 70–110 mg/dl), hyperuricemia 18.2 mg/dl (normal 2.4–7 mg/dl), acute renal failure with creatinine 4.06 mg/dl (normal 0.5–0.9 mg/dl), creatine phosphokinase above 5,000U/L (normal 24–195 U/L) and markedly elevated liver enzymes. Complete blood count showed hemoglobin 13.8 g/dl (normal 12–16 g/dl), white blood count 14,900 ml (normal 4,800–10,800) and platelets 209,000 ml (normal 130,000–400,000). Blood cultures and viral serology for Epstein-Barr virus, cytomegalovirus, hepatitis C virus, hepatitis B virus, herpes and human immunodeficiency virus were taken. Later she was found to be positive for HCV. The rest of the serology returned negative. International normalized ratio measured 2.9 (normal 0.9–1.3). Clotting factor V levels were 4% (normal 50–150%) and urine qualitative toxicology screening (Multi-Drug One Step Screen Panel, Acon Laboratories, San Diego, CA, USA) was positive for opiates and PCP and negative for alcohol, acetaminophen, benzodiazepines, barbiturates, amphetamines, cannabis, metamphetamines, cocaine and tricyclic antidepressants.

The patient was intubated and mechanically ventilated but later went into cardiac arrest. Cardiopulmonary resuscitation was initiated and her pulse returned after multiple doses of atropine and adrenalin. The patient stabilized, underwent urgent hemodialysis and was later transferred to the general intensive care unit. There she received intravenous N-acetylcysteine (given empirically, initial dose 150 mg/kg followed by 50 mg/kg for 4 hours and 100 mg/kg for the next 16 hours) [3] and broad-spectrum antibiotics. Fresh frozen plasma and red blood cells were given. Brain computed tomography scan excluded intracranial hemorrhage. The patient underwent daily hemofiltration and treatment with MARS (molecular adsorbents recirculation system). On the second day she was diagnosed with compartment syndrome of the right arm, necessitating fasciotomy. Later, fever developed reaching 39.5°C. On the third day, the patient died with the diagnosis of multi-organ failure. Postmortem examination was not performed due to family refusal.

Comment

Phencyclidine was developed in the 1950s as an intravenous anesthetic. Its use in humans was discontinued in 1965 because patients often became agitated, delusional and irrational while recovering from its anesthetic effects. Today it is illegally manufactured in laboratories and is sold on the street with names such as *angel dust*, *ozone*, *wack*, and *rocket fuel* (names that also reflect variability in contents and effects). When PCP is combined with marijuana, it goes under the name *killer joint* and *crystal supergrass*. The variety of street names for PCP reflects its bizarre and volatile effects [1]. It is readily soluble in water or alcohol and appears in the illicit drug market in the form of tablets, capsules and colored powders. It is normally used in one of four ways: snorted, smoked, ingested, or injected intravenously. For smoking, PCP is often applied to a leafy material such as mint, parsley, oregano, or marijuana [1].

The clinical manifestations of PCP intoxication are extremely variable. In a large study of 1,000 patients with acute PCP toxicity, nystagmus (horizontal, vertical, or rotary) and hypertension were present in more than half the cases. Central nervous system involvement included coma, lethargy/stupor, and acute brain syndrome. A small percentage of patients had severe disturbances in vital signs, including 3 cases of cardiac arrest and 28 cases of apnea. Hypoglycemia and elevated serum CPK, uric acid, and liver enzymes were common [2], along with rhabdomyolysis, acute renal failure and hyperthermia causing submassive liver necrosis [4]. In adult patients the manifestations of PCP use can be grouped into clinical patterns of intoxication. The patterns include coma, catatonic syndrome, toxic psychosis and acute brain syndrome. Coma may last from 2 to 24 hours, and the symptoms are more intense. Patients with severe toxicity, including status epilepticus and malignant hyperthermia, may remain in coma for 1 day to 3 weeks. These patients often have respiratory or metabolic acidosis and rhabdomyolysis.

In 2002, 918 exposures to PCP were recorded in the United States, according to the AAPCC (American Association of Poison Control Centers). Major outcome was noted in 96 patients. Most of the mortality cases had consumed, along with PCP, other drugs such as cocaine or benzodiazepines [5]. There has been a steady increase in documented toxic exposure to PCP, from 400 exposures in 1995 to 900 in 2002.

This is the first documented case of PCP exposure in Israel, even though PCP is a common street drug in the U.S. It is our estimation that in the hours preceding admission, our patient had PCP-induced hyperthermia, which caused severe liver failure and rhabdomyolysis, followed by acute renal failure, hyperkalemia and acidosis. The patient arrived at the hospital more then 24 hours after the alleged intoxication and was unconscious most of that time. Hence hyperthermia or subclinical seizures were not documented. The possibility of false positive PCP screening results exists in patients recently treated with an SSRI, dextromethorphan or diphenhydramine, which our patient's family denied. HCV-induced acute hepatic failure in this case is also not likely since she was known for the last few years to be a stable HCV carrier. The presence of opiates in the urine sample might explain the grave results since opiate use can cause respiratory failure and aggravate cardiac complications. Since PCP is mixed on many occasions with other narcotics, it is also consistent with drug abuse and possible PCP consumption.

The acute presentation of circular nystagmus with dilated pupils, encephalopa-

HCV = hepatitis C virus
CPK = creatine phosphokinase
SSRI = serotonin-selective reuptake inhibitor

thy, and persistent hypoglycemia, rhabdomyolysis complicated by compartment syndrome in unusual sites (i.e., arm), acute renal failure and liver necrosis in a previously healthy patient without evidence of alcohol, amphetamine or cocaine consumption, is highly suspicious for PCP intoxication even without a positive toxic screen. The case presented here demonstrates the challenge of treating severe PCP intoxication, and hopefully, will raise awareness regarding other possible cases of PCP exposure in Israel.

References

1. PCP (Phencyclidine) Info Facts. National Institute on Drug Abuse, National Institute of Health. April 2004, www.drugabuse.gov
2. McCarron MM, Schulze BW, Thompson GA, Conder MC, Goetz WA. Acute phencyclidine intoxication: incidence of clinical findings in 1,000 cases. *Ann Emerg Med* 1981;10:237–42.
3. Harrison PM, Wendon JA, Gimson AE, Alexander GJ, Williams R. Improvement by acetylcysteine of hemodynamics and oxygen transport in fulminant hepatic failure. N *Engl J Med* 1991;324(26):1852–7.
4. Armen R, Kanel G, Reynolds T. Phencyclidine-induced malignant hyperthermia causing submassive liver necrosis. *Am J Med* 1984;77:167–72.
5. Watson WA, Litovitz TL, Rodgers GC Jr, et al. 2002 Annual Report of the American Association of Poison Control Centers Toxic Exposure Surveillance System. *Am J Emerg Med* 2003;21:353–421.

Correspondence: Dr. A. Zeidman, Dept. of Internal Medicine B, Rabin Medical Center (Golda Hasharon Campus), 7 Keren Kayemet Street, Petah Tikva 49372, Israel.
Fax: 972-3-937-2622
email: alizaz@clalit.org.il

Fuzzy Language

The following list of phrases and their definitions might help you understand the fuzzy language of science and medicine. These special phrases are also applicable to anyone reading a PhD dissertation or academic paper.

"It has long been known"...
I didn't look up the original reference.

"A definite trend is evident"...
These data are practically meaningless.

"While it has not been possible to provide definite answers to the questions"...
An unsuccessful experiment but I still hope to get it published.

"Three of the samples were chosen for detailed study"...
The other results didn't make any sense.

"Typical results are shown"...
This is the prettiest graph.

"These results will be in a subsequent report"...
I might get around to this sometime, if pushed/funded.

"In my experience"...
Once.

"In case after case"...
Twice.

"In a series of cases"...
Thrice.

"It is believed that"...
I think.

"It is generally believed that"...
A couple of others think so, too.

Correct within an order of magnitude" ...
Wrong. Wrong. Wrong.

"According to statistical analysis"...
Rumor has it.

"A statistically oriented projection of the significance of these findings"...
A really wild guess.

"A careful analysis of obtainable data"...
Three pages of notes were obliterated when I knocked over a beer glass.

"It is clear that much additional work will be required before a complete understanding of this phenomenon occurs"...
I don't understand it....and I never will.

"After additional study by my colleagues"...
They don't understand it either.

"A highly significant area for exploratory study"...
A totally useless topic selected by my committee.

Contributed by Haggai Carmon