Poisoning by Thallium
A Study of Five Cases

Enrique Villanueva, Claudio Hernandez-Cueto, Emilia Lachica, Maria D. Rodrigo and Valentin Ramos
Cátedra de Medicina Legal y Toxicología, Facultad de Medicina, Universidad de Granada, Granada, Spain

Summary

Thallium poisoning seldom occurs in Spain. This article reports 5 cases of thallium poisoning, of which 4 of the patients belonged to the same family. The cases occurred in or near Granada between 1985 and 1987.

The symptoms were initially gastrointestinal (vomiting, abdominal pain, gastrointestinal haemorrhage, etc.) in the case of the family poisoning, and a sensitive-motor polyneuritis in the fifth case. The diagnosis was established by analysis carried out in the authors' laboratory; urinary thallium concentrations were determined by atomic absorption spectrophotometry with graphite furnace and monovalent hollow cathode lamp. Each case was followed up to confirm the efficacy of the treatment; recovery from the poisoning was complete in all cases after 3 to 9 weeks.

Poisoning by thallium seldom occurs in Spain, with no cases reported to the National Institute of Toxicology during the past 25 years. Commercial use of the compound is low: at present there is no thallium-containing insecticide registered with the Spanish Ministry of Agriculture, and it is no longer used as a depilatory agent. However, thallium is still used in the manufacture of optical lenses, because of the ability of thallium bromide and iodide crystals to transmit long-wave radiation. It is also used in the electrical and electronics industries as a catalytic agent, and for the production of pyrotechnics.

The increasing resistance to coumarins in rodents may lead to a renewed interest in thallium salts in the near future, which could increase the incidence of this potentially serious poisoning. The most important case described in the literature occurred in Granada, Spain, in 1930: it involved 16 infantile poisonings, 14 of which were fatal. It happened in an orphanage, and was due to a dosage error in the treatment of a tinea infection (Alvarez de Toledo 1933).

Other cases have been described in recent years: 1 acute poisoning in Barcelona in 1982 (Nogue et al. 1982); an attempted murder of 4 people (McCormack & McKinney 1983); another case of criminal poisoning described by Trenkwalder et al. in 1984; the poisoning of 4 students in Würzburg (West Germany) described by Metter and Vock in 1984; an accidental 'outbreak' of thallium poisoning in India (Chakrabarti et al. 1985); and a suicidal poisoning of a young man in Japan (Aoyama et al. 1986).

Because of the difficulty in diagnosing thallium poisoning, the possibility of renewed use of the
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compound and the severity of the cases, this article presents 5 cases of thallium poisoning studied in the authors' laboratory. Four of these cases were members of the same family.

Case Reports

Family Poisoning

This intoxication occurred in 4 members of a family of 6 from a small village near Granada. On 18 February 1985, the mother presented at hospital with a 24-hour history of severe pain in her spinal column and paraesthesia. The next day, the older daughter (10 years old) presented with persistent vomiting, and the father with paraesthesia in his legs and pain when he walked. 12 days later, a younger daughter (3 years old) also developed intense and persistent vomiting. The parents reported that 2 months earlier another of their daughters, aged 5, had suffered complete hair loss.

The 2 girls were admitted to the intensive care unit in the University Hospital because of the severity of their clinical picture. On admission, the older girl showed the following symptoms: abdominal pain, vomiting, weakness in the legs and diplopia, with an initial diagnosis of poliomyelitis. Subsequent symptoms were headache, dysphagia, cramps and hyperaesthesia. There were violent fits of muscular contractions which responded to treatment with diazepam 10 mg/day. The clinical picture deteriorated after the appearance of gastrointestinal and genitourinary haemorrhage.

On 8 March (about 2 weeks after admission) total hair loss occurred. This led to a diagnosis of thallium poisoning, which was confirmed 3 days later. Treatment with Prussian blue 250 mg/kg/day was initiated. The drug was administered by duodenal tube administration (with 100ml 10% mannitol) every 6 hours until the urinary excretion of thallium was < 0.5 mg/day. The symptoms resolved in 20 days.

The younger girl was admitted to the hospital 10 days after her sister, with a predominance of neurological symptoms (difficulty in movement, weakness, dysphagia) and total hair loss. One week after admission there was a palmar epidermal desquamation of her hands.

The father was admitted on 26 February (4 days after his older daughter), with epigastric pain which was not accompanied by vomiting. Other symptoms rapidly appeared: paraesthesia and myalgia in the legs, persistent constipation, and anxiety and nervousness. Two weeks after admission, there was a complete loss of his hair. The electromyelogram showed a decrease both in conduction velocity and in the evoked potentials.

The mother was admitted on 4 March, presenting with mild paraesthesia, confusion and mental agitation.

Individual Poisoning

This case concerned a 25-year-old woman with a psychiatric history of depression. She took a quarter of a teaspoon of a rodenticide (thallium sulphate) on 18 July 1987; later she tried to induce vomiting. Nine hours after ingestion she felt paraesthesia in hands and feet, which later spread to her legs and increased in intensity. In addition, she had abdominal and dorsal pain; on admission she also had spontaneous muscular pain. The case was diagnosed as an axonal sensitive-motor polyneuropathy secondary to ingestion of thallium sulphate. On the third day after admission the patient had episodes of hypertension together with orthostatic hypotension, and complete alopecia.

The aetiological diagnosis was confirmed by laboratory tests. Treatment with Prussian blue 250 mg/kg/day was begun, and 6 weeks later recovery was complete.

Analytical Data

Family Poisoning

Analyses were performed in urine for mercury, arsenic, lead and thallium. Positive results were obtained only for thallium; the values are shown in table I and fig. 1. This analysis was carried out by flame atomic absorption spectrometry after chelation of samples with sodium diethyldithiocarbamate and extraction in methylisobutylketone (Hologgitas et al. 1980).