

CASE REPORT

P. Kintz · C. Jamey · S. Doray · B. Ludes

Acute fatal poisoning with dichlorophen

Received: 27 November 1996 / Received in revised form: 23 January 1997

Abstract A case is presented involving an acute fatality resulting from self-administered dichlorophen, a chlorophenol fungicide. The compound was quantified using gas chromatography/mass spectrometry after extraction with methyl-tert-butyl ether, derivatization by methylation and separation on a HP5-MS capillary column. The blood concentration was 9.77 mg/l and other drugs, including ethanol, were not detected.

Key words Dichlorophen · Poisoning · Gas chromatography/mass spectrometry

Introduction

Dichlorophen (4,4'-dichloro-2,2'-methylenediphenol) forms colourless, odourless crystals. As a fungicide and bactericide it is recommended for the protection of textiles and materials including horticultural benches and equipment against moulds and algae, and is used (at 16 kg/ha) to control moss in turf (British Crop Protection Council 1991). Dichlorophen is also used in the treatment of tapeworm infestation in man and animals (Gemmell and Johnstone 1981; Idris et al. 1980; Bankov 1976) and is the basis of a preparation against athlete's foot. To the best of our knowledge, no fatal case involving humans has been reported in the literature, although some adverse effects such as wheezing (Watt 1991), or dermatitis (Meynardier et al. 1982) have been documented.

Case history

A 59-year-old female (height 1.68 m, weight 46 kg) was found dead, lying in a forest with no evidence of violence. An empty 1 liter bottle of "Stop Mousse (dichlorophen Na, 360 g/l)" was found near the body. Several stains of vomit were identified on the face and on the ground and cyanosis was observed in all the fingers. Only an external postmortem examination was carried out as no

autopsy was requested and blood, urine and vitreous humor were taken for toxicological analysis.

Materials and methods

Postmortem specimens were analysed for dichlorophen by gas chromatography/mass spectrometry, according to the following method.

To a 15 ml screw-top tube were added 1 ml of biological sample and 20 µl of 2,4,5-trichlorophenol (100 mg/l) as an internal standard, followed by 5 ml methyl-tert-butyl ether (pesticide grade). Urine was previously hydrolysed with 1 ml of concentrated sulphuric acid for 30 min. After agitation and centrifugation, the organic upper layer was evaporated to dryness and the residue was derivatized with 60 µl of Meth-Prep (Alltech) for 20 min at ambient temperature. A 1.5 µl aliquot of the derivatized extract was injected into a HP5-MS (30 m × 0.25 mm, i.d., 5% phenyl-95% methylsiloxane) capillary column of a Hewlett Packard 5890 Serie II Plus gas chromatograph via an HP 6890 autosampler. Detection was achieved with a mass selective detector HP 5972 operated at 70 eV with an ion source temperature of 190°C. The electron multiplier voltage was set at + 300V above the autotune voltage. The column oven temperature was programmed from an initial temperature of 60°C to 295°C at 30°C/min and maintained at 295°C for the final 4 min. Splitless injection with a split valve off-time of 0.75 min was employed. The injector temperature was 240°C. The flow of carrier gas (helium, purity grade N55) through the column was 1.0 ml/min.

Results and discussion

The response for dichlorophen was linear in the range 0.5–20 mg/l ($r = 0.998$) and the extraction recovery established for a concentration of 2.0 mg/l was 83.8%. The limit of detection for extracted dichlorophenol was 0.05 mg/l and within-run precision was less than 6%. Under the chromatographic conditions used, there was no interference with the drug or the internal standard by any extractable endogenous material present in the biological specimens. Figure 1 shows the blood extract in selected ion monitoring mode, along with the electron impact mass spectrum with characteristic ions at m/z 121, 155, 261 and 196. Methylation of the phenolic groups dramatically enhanced the chromatographic profile of dichlorophen as no tailing peak was observed.

The blood submitted in this case was screened for ethanol, organic solvents, psychotropic compounds and drugs of abuse by classical gas-liquid chromatography

P. Kintz (✉) · C. Jamey · S. Doray · B. Ludes
Institut de Medecine Legal, 11 rue Humann,
F-67085 Strasbourg Cedex, France
FAX: +33 (3) 8824 0085

Fig. 1 Above: Blood extract in selected ion monitoring mode. The concentration was 9.77 mg/l. Below: Electron impact mass spectrum of dichlorophen-2Me

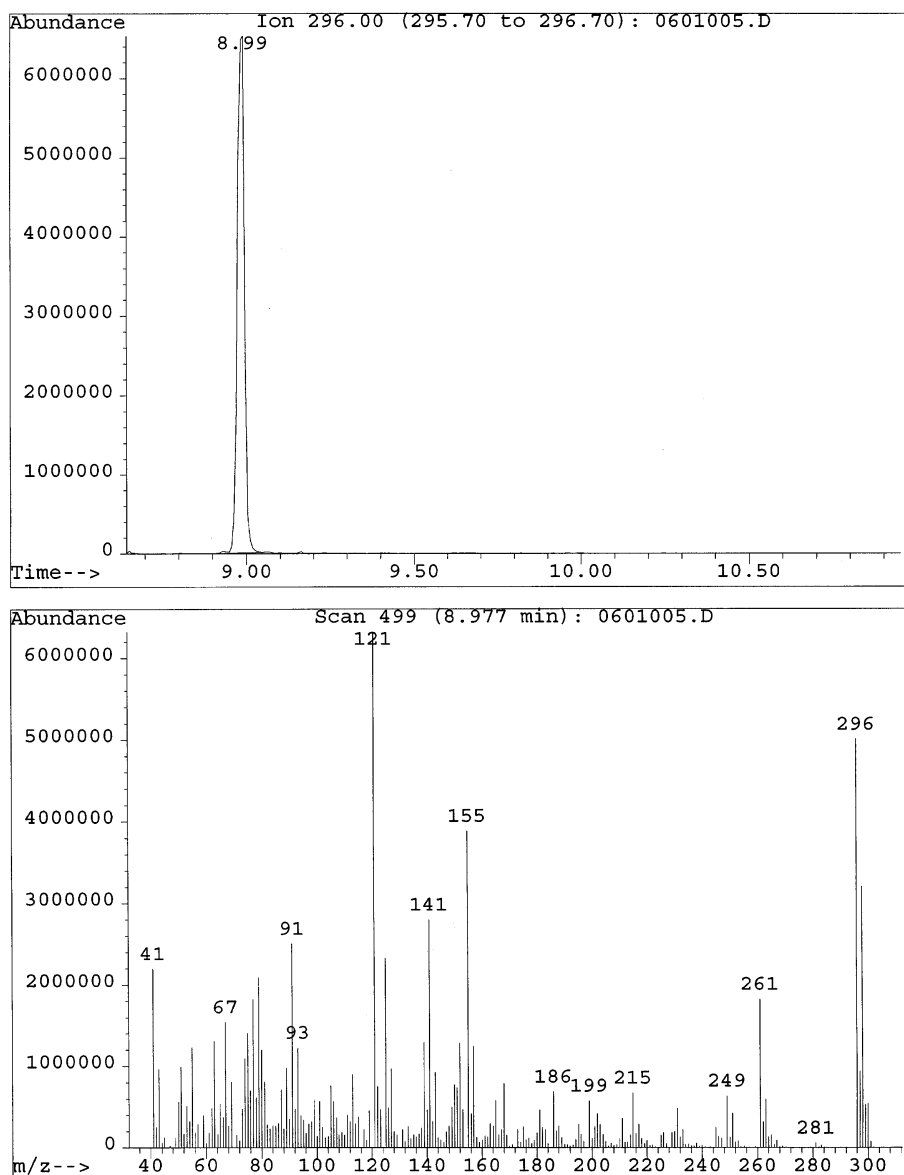


Table 1 Levels of dichlorophen in the post-mortem specimens

Specimen	Dichlorophen (mg/l)
Blood	9.77
Urine	0.10
Vitreous humor	1.12

procedures. No ethanol or other drugs were detected and the concentration of dichlorophen in whole blood was 9.77 mg/l (Table 1). This concentration could not be compared with previous reports, as the literature is lacking data concerning dichlorophen. For this reason, these data are useful for presenting information on the levels of the drug in human samples. The low level of dichlorophen detected in urine suggests that death occurred soon after administration or that the drug was rapidly metabolized. Due to the low volume of urine (less than 2 ml) a metabolic profile was not investigated.

In the view of the circumstances, the medial examiner listed the death as a suicide with dichlorophen.

References

- Bankov D (1976) Opiti za diagnostika i terapiia na stilezizozata po ovtsete (in Russian). *Vet Med Nanki* 13:28–36
- British Crop Protection Council (1991) Dichlorophen. In: Worthing CR, Hance RJ (eds) *The pesticide manual*, 9th edn. Urwin Brothers Limited, Old Woking, Surrey, p. 253
- Gemmell MA, Johnstone PD (1981) Cestodes. *Antibiot Chemother* 30:54–114
- Idris M, Rahman KM, Muhalid MA, Azad Kahn AK (1980) The treatment of fasciolopsiasis with niclosamide and dichlorophen. *J Trop Med Hyg* 83:71–74
- Meynardier JM, Meynardier J, Colmas A, Castelain PY, Ducombs G, Chabeau G, Lacroix M, Martin P, Nangu Z (1982) Allergie aux conservateurs (in French). *Ann Dermatol Venereol* 109:1017–1023
- Watt SJ (1991) Wheezing in a commercial diver due to disinfectant. *Undersea Biomed Res* 18:347–349