

---

# Survival after accidental ingestion of a fatal dose of diquat

**Sir** - We report a case of accidental poisoning with a potentially fatal dose of diquat in a 10 year old boy where the child survived with few ill-effects. Serum diquat levels were higher than those found in two fatal cases.

Poisoning with bipyridyl compounds is uncommon in childpoisoning is much less common than paraquat poisoning. Deliberate ingestion of paraquat or diquat, more usual than accidental ingestion in adults does, not occur in children.<sup>1</sup> Most accidental cases are the result of decanting of herbicide into a 'soft drinks' bottle. Likelihood of survival is inversely related to amount ingested, and the fatal dose of diquat in an adult is thought to be 6-12 grams.<sup>2</sup> Prognosis may also be influenced by relation of time of poisoning to a meal, subsequent spitting out or vomiting of the compound and prompt and appropriate treatment. Serum diquat levels are of less value in predicting survival than serum paraquat levels, as data are scant on the subject.

A 10 year old boy was admitted half an hour after accidental ingestion of a mouthful (Estimated as 30 ml.) of "Reglone" weedkiller, containing 20% diquat (Equivalent to approximately 6 grams). His father had decanted the substance, a dark brown liquid, into a "Coke" bottle, the child had eaten a substantial meal 20 minutes before the incident. He had spat the liquid out immediately, his mouth had been washed out and he was made to drink three cups of water. He vomited profusely 15 minutes later.

On admission he was vomiting persistently but was alert and vital signs were normal. Immediate therapy was instituted with Fuller's Earth 30% in 200ml water, magnesium sulphate 20% in 100ml water and 150ml of 20% mannitol, given hourly through nasogastric tube, as vomiting occurred after each dose. Metoclopramide 5mg. intravenously was given four-hourly. Dextrose 2.5%/Saline 0.45% was infused at 500ml/hour to produce a diuresis of greater than 200ml/hour. Other treatment given was Vitamin C one gram four times daily, Vitamin E 250mg per day, colchicine one mg. per day and prednisolone 10mg per day. Activated charcoal 100 ml four hourly via nasogastric tube was substituted for Fuller's Earth at 24 hours.

The only ill effect noted was mild oropharyngeal ulceration and angular stomatitis at 14 hours after ingestion. Serial renal function tests were normal. Hepatic transaminases were slightly elevated from days 1 to 5.

Diquat and paraquat are both bipyridyl herbicides, but diquat has a different base, ethylene dibromide. Reglone and Aquacide are the only commercial weedkillers in Britain and Ireland which contain diquat alone, though it is present, along with

paraquat in "Cleansweep" liquid, "Pathclear" granules and "Weedol" granules. Diquat causes less corrosive damage to the upper gastrointestinal tract than does paraquat but vomiting diarrhoea and gastrointestinal dilatation with extracellular fluid sequestration are prominent features of diquat poisoning.<sup>3</sup> Unlike paraquat, it is not selectively taken up by lung tissue,<sup>4</sup> and pulmonary fibrosis does not occur. Both compounds are secreted by renal tubules, but renal impairment is more likely in diquat poisoning. Pontine infarction is found at postmortem in fatal cases.<sup>3</sup> A symptom-free interval of 24 to 48 hours is common after poisoning with diquat, and in many cases the omission of early and correct treatment may have contributed to deaths.

Treatment of poisoning by diquat should be commenced as soon as possible, but where high doses are ingested survival is unlikely.<sup>2</sup> The amount taken is often uncertain, particularly as the amount contained in a mouthful may be underestimated, and in accidental poisoning the compound is usually spat out. Serum levels are helpful as a guide to severity of paraquat poisoning, and can be plotted on a graph predicting survival likelihood.<sup>5</sup> As cases of diquat poisoning are less common, no such graph is available to date. Comparing our case of diquat poisoning with two fatal cases<sup>6,7</sup> in the literature where serum levels had been measured in the first 12 hours, we were surprised to find that levels in our patient were higher.

Review of fifteen reported cases of diquat poisoning in the literature to date<sup>3,7,8</sup> showed only one case in a child. Ten of these cases were fatal, including the two year old boy who had drunk an unknown amount of diquat from a "soft drinks" bottle. Clinical features and postmortem findings in this case were similar to those in adults. Fitzgerald et al., in a study of diquat and paraquat poisoning in the Republic of Ireland between 1967 and 1977<sup>1</sup> found 13 cases of accidental paraquat poisoning in children, three fatal. They reported five instances of diquat poisoning, all in adults, three of which were fatal. Decanting of the herbicide into alcohol or "soft drink" bottles was a factor in most accidental cases.

Deliberate suicidal poisoning will continue to occur as long as these extremely dangerous compounds are commercially available. Accidental poisoning might be reduced if a copy of the excellent booklet on the treatment of bipyridyl poisoning<sup>9</sup> was supplied whenever paraquat or diquat poison was purchased.

Buckley DA  
McKiernan J

Cork Regional Hospital  
Cork

## References

- 1 Fitzgerald GR, Barniville G, Flanagan M, Silke B, Carmody M, O'Dwyer WF. The changing pattern of paraquat poisoning: an epidemiologic study. *J Ir Med Assoc.* 1978; 71: 103-8
- 2 World Health Organisation Booklet (1984). Environmental health criteria 39; Paraquat and diquat.
- 3 Vanholder R, Colardyn F, Renck De J, Praet M, Lameire M, Ringoir S. Diquat intoxication. Report of two cases and review of the literature. *Am J Med* 1981; 70: 1267-71.
- 4 Litchfield MH, Daniel JW, Longshaw S. The tissue distribution of the bipyridylum herbicides diquat and paraquat in rats and mice. *Toxicology* 1973; **1**: 155-65.
- 5 Proudfoot AT, Stewart MS, Levitt T, Widdop B. Paraquat poisoning: significance of plasma paraquat concentrations. *Lancet* 1979; ii: 330-2.
- 6 Okonek S, Hoffman A. On the question of extracorporeal haemodialysis for diquat intoxication. *Arch Toxicol* 1975; 33: 251-7.
- 7 Powell D, Pond SM, Alien TB, Portale AA. Hemoperfusion in a child who ingested diquat and died from pontine infarction and hemorrhage. *J Toxicol Clin Toxicol* 1983; **20(5)**: 405-20.
- 8 McCarthy LG, Speth CP. Diquat intoxication. *Ann Emerg Med* 1983; **12(6)**: 394-6.
- 9 The treatment of paraquat poisoning: guide for doctors. ICI 1987.