

ACUTE POISONING WITH SOLDERING FLUX (ZINC CHLORIDE IN HYDROCHLORIC ACID) - IS THE EARLY CHELATION THERAPY INDICATED ?

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Liquid soldering fluxes may contain 10 - 35% zinc chloride (ZnCl_2) and up to 40% hydrochloric acid (HCl)¹. Ingestion of small doses of these products results in a severe corrosion of the gastrointestinal tract and in increased zinc concentrations in blood and tissues. We report three cases of life-threatening poisonings with soldering fluxes in Germany in 1996:

(1) A 67-year-old man was found unconscious. He had ingested 20 ml of a yellowish fluid containing ZnCl_2 and HCl. Endoscopy showed vast corrosion of the mouth cavity, oesophagus and stomach. Bronchoscopy was inconspicuous. Fever and leukocytosis developed, which could not be reduced by antibiotic therapy. Renal and hepatic functions were altered. The initial zinc concentration in serum was 13,4 mg/l (205 $\mu\text{mol/l}$), 10 times higher than reference concentrations (0,7-1,5 mg/l, 11-23 $\mu\text{mol/l}$, resp.). As plasma zinc levels decreased rapidly (8,3 mg/l within the first day after ingestion; 3,5 mg/l four days later) no chelation therapy was carried out. Unfortunately, pulmonary function deteriorated during the following days. On day 9 the patient died from ARDS.

(2) A 38-year-old woman ingested 20 ml soldering fluid with suicidal intention. Endoscopically the mucous membranes of oesophagus were only flushed, but in the distal region of gastric membranes circular ulcerations were shown. The high initial serum zinc level (18,2 mg/l, 278 $\mu\text{mol/l}$ resp.) could be normalized under chelation therapy with DTPA (calcium disodium salt of diethylenetriamine pentaacetic acid, Ditripentat Heyl[®], 500 mg/h in isotonic NaCl solution continuously) for three days. The patient recovered, but a subtotal gastrostenosis developed in consequence of the corrosion and must be resected.

(3) A 27-year-old man suffering from depressive illness ingested about 250 ml soldering fluid. He was hospitalised with general corrosion of the whole gastrointestinal tract. The initial zinc concentration in serum was 39 mg/l. Chelation therapy with DTPA (as mentioned above) was started 12,5 hours later and then continued over the next 4 days. The zinc serum levels decreased to 0,73 mg/l at the end of the treatment, whereas the urine concentration was 179 mg/l on the first day of treatment and 6,2 mg/l on the last. The patient recovered under further supportive treatment and was referred to a psychiatric ward.

Conclusions: Severe local toxicity after ingestion of ZnCl₂/HCl soldering flux presented in all three cases, but the systemic toxicity and final outcome differs impressively depending on chelation therapy with DTPA even when higher doses of ZnCl₂ were ingested. DTPA decreases the serum zinc levels by an increase of the urinary zinc excretion². It is supposed that the early chelation therapy with DTPA prevents systemic toxicity of zinc overload.

1. GOSSELIN RE, SMITH RP, HODGE HC.

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2. DOMINGO JL, LLOBET JM, PATERNAIN JL, CORBELLA J.

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