



Letter to the Editor

Efficacy of Therapeutic Plasma Exchange and Hemodialysis in the Treatment of Theophylline Intoxication

Teofilin İntoksikasyonunun Tedavisinde Terapötik Plazma Değişimi ve Hemodiyalizin Etkinliği

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Dear Editor,

Theophylline is a methylxanthine derivative used to treat bronchospastic disorders in children and adults, and to address apnea and bradycardia in newborns (1,2). As a methylxanthine derivative, theophylline increases intracellular cyclic adenosine monophosphate by inhibiting phosphodiesterase, thereby inducing smooth muscle relaxation. Blood theophylline levels above 15 µg/mL are associated with a risk of toxicity, whereas serum concentrations between 5-15 µg/mL are considered safe and effective (3). Because of its narrow therapeutic window, both chronic use and acute ingestion can cause serious poisoning. Management aims to reduce gastrointestinal absorption, monitor serum levels, and treat cardiac, neurological, and metabolic complications. Although extracorporeal elimination methods such as hemoperfusion, hemodialysis, and therapeutic plasma exchange (TPE) have been employed in intoxication cases, supportive care remains the cornerstone of treatment (4).

We report the case of a 15-year-old female who developed severe toxicity following the intentional ingestion of 30 tablets of sustained-release theophylline (Teokap® SR 200 mg) and who was admitted to our pediatric intensive care unit approximately 10 hours later. At the initial center, gastric lavage and activated charcoal were administered one hour after ingestion, but treatment was discontinued because

the family refused further care. Eight hours later, the patient re-presented with palpitations and hand tremors, and was transferred to our hospital. On admission, she was conscious (Glasgow Coma Scale 15), with a blood pressure of 90/68 mmHg, a heart rate of 153 bpm, a respiratory rate of 19/min, and a temperature of 37 °C. Tremor, nystagmus, and hyperreflexia were observed, whereas examinations of other systems were unremarkable. The patient's serum theophylline level was 49.4 µg/mL at admission.

Laboratory findings revealed leukocytosis (20,110/mm³), serum potassium of 3.2 mmol/L, lactate of 5.6 mmol/L, and metabolic alkalosis (pH 7.45, HCO₃ 21.7 mmol/L). The electrocardiography showed sinus tachycardia. Intravenous hydration was initiated with 0.9% NaCl, followed by maintenance fluids containing 5% dextrose+0.9% NaCl and 40 mEq/L KCl. Ondansetron (8 mg IV) was administered for severe nausea and vomiting. Since the ingested formulation was extended-release, multiple-dose activated charcoal (50 g every 6 hours) and polyethylene glycol were administered to enhance elimination (5,6). Within the first hour of admission, continuous venovenous hemodiafiltration was initiated due to ventricular ectopy and tachycardia reaching 220 bpm. A 12 Fr femoral dialysis catheter was inserted; dialysate flow was 2000 mL/1.73 m²/hr and replacement was 35 mL/kg/hr, using standard solutions containing 2 mmol/L K⁺, without net ultrafiltration.

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Additionally, TPE with 4% albumin was performed once. Electroencephalography showed periodic epileptiform discharges, and midazolam infusion was started. After 32 hours of hemodialysis, blood pressure stabilized, sinus rhythm was restored, and dialysis was terminated. Following 92 hours of intensive care monitoring, the patient was discharged for psychiatric and social services follow-up.

All types of arrhythmias can develop during theophylline intoxication, ranging from sinus tachycardia to ventricular fibrillation. Extracorporeal treatment methods such as hemodialysis and hemoperfusion are preferred in severe ventricular arrhythmias, while calcium channel blockers or β -blockers may be used in supraventricular tachycardia (7). In our patient, sinus tachycardia and ventricular extrasystoles improved following the combined use of hemodialysis and TPE.

We consider that the uninterrupted combined use of hemodialysis and TPE contributed to the rapid improvement in hemodynamic findings. Although the literature suggests that TPE is less effective than hemodialysis or hemoperfusion for theophylline elimination, our experience indicates that TPE may still be beneficial in selected cases (8).

In conclusion, close monitoring is essential because acute theophylline intoxication can be fatal, particularly from cardiac and neurological complications. The combined use of hemodialysis and TPE may provide rapid resolution of symptoms and should be considered in severe cases that are unresponsive to supportive therapy.

FOOTNOTES

Authorship Contributions

Surgical and Medical Practices: N.A., E.Ş., Concept: N.A., Design: M.E.M., E.Ş., Data Collection or Processing: M.E.M.,

N.A., Analysis or Interpretation: E.Ş., Literature Search: M.E.M., N.A., E.Ş., Writing: M.E.M.

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