



" Toluene-Related AKI: Single-Session Dialysis as an Effective Rescue Strategy "



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Background

- ❑ **Toluene intoxication**, often from occupational or recreational exposure (e.g., glue sniffing), can lead to renal complications such as acidosis and various electrolyte disturbances.
- ❑ Treatment is usually supportive, and hemodialysis (HD) is not routinely indicated due to poor dialyzability of toluene and its metabolite, hippuric acid.
- ❑ While there is no specific antidote for toluene toxicity, approximately 80% of toluene is metabolized to hippuric acid, which is excreted by the kidneys.
- ❑ Restoring renal function can enhance toxin clearance.
- ❑ **In this case, HD was used not for toxin removal, but as supportive therapy to correct metabolic acidosis and promote renal recovery.**

Objective

- ❑ To present a case highlighting the **potential role of HD** in managing severe metabolic complications of toluene intoxication with concurrent acute kidney injury (AKI).

Case Report

- ❑ A 45-year-old male presented with acute dyspnea after prolonged exposure to paint fumes in a poorly ventilated space. On arrival, he was agitated, but alert and oriented. Vital signs were stable, with a respiratory rate of 28/min and SpO₂ of 98%. Physical examination revealed Kussmaul respirations, clear lung fields, and no focal neurological deficits.
- ❑ Initial laboratory investigations (Table 1) demonstrated AKI and a mixed high- and normal-anion gap metabolic acidosis. Serum ketones and lactate were within normal limits. Based on clinical history and laboratory findings, hippurate toxicity and a distal acidification defect mimicking RTA were suspected. Urinalysis showed an elevated urine osmolal gap, consistent with the presence of unmeasured urinary solutes. Supportive care was initiated.
- ❑ Despite improvement in renal markers (serum creatinine declined from 1.48 to 1.1 mg/dL and urine output reached 0.7 mL/kg/h), the patient had persistent symptoms and refractory acidosis (Table 2).
- ❑ **Consequently, HD was initiated approximately 12 hours after presentation. A single 4-hour HD session without ultrafiltration resulted in marked clinical and biochemical improvement.** Urine output increased to 0.9 mL/kg/h, and urine analysis later confirmed the presence of hippuric acid. No further dialysis was needed, and the patient was discharged on hospital day 5 with complete symptom resolution.

Conclusion

- ❑ Although not routinely used for toluene removal, HD can be considered a supportive intervention in cases of toluene-induced AKI with refractory metabolic acidosis.
- ❑ **It may help restore renal function and facilitate toxin excretion.** Further studies and case series are needed to clarify its therapeutic role.

Table 1 : Laboratory Parameters at Presentation

Serum parameter	Results	Reference Range
BUN	26	6 - 20 mg/dL
Creatinine	1.48	0.51-0.95 mg/dL
Sodium	135	135 - 145 mmol/L
Potassium	4.2	3.5 - 5.1 mmol/L
Chloride	108	98-107 mmol/L
Bicarbonate	4	22-29 mmol/L
Albumin	4.6	3.5-5.5 g/dL
Calcium	9.3	8.4-10.2 mg/dL
Phosphorus	4.4	2.5 - 4.5 mg/dL
Serum osmolarity	311	275-295 mOsm/kg
Ketone	0.9	0-0.6 mmol/L
Lactate	0.8	0.5-2.2 mmol/L
Blood glucose	116	70-110 mg/dL
Serum Osmolal gap	17.5	mOsm/kg
Serum methanol	9.9	mg/dL (toxic level > 20 mg/dL)
VBG		
pH	7.07	
CO2	13	32-46 mmHg
HCO3-	3.8	mmol/L

Urine parameter	Results	Reference Range
Specific gravity	1.030	1.003-1.030
pH	5.5	5-8
Protein	1+	Negative
Blood	3+	Negative
WBC	3-5	0-5/HPF
RBC	50-100	0-2/HPF
Squamous epi.	0-1	
Spot urine sodium	91	mmol/L
Spot urine K	97.8	mmol/L
Spot urine chloride	88	mmol/L
Urine Osmolarity	880	mOsm/kg
Spot urine urea	834	mg/dL
Spot urine glucose	<2	mg/dL
Spot urine calcium	20	mg/dL
Spot urine phosphorus	139.6	mg/dL
Urine hippurate	13.07	negative g/g creatinine
Urine Osmolol gap	204.5	mOsm/kg

Table 2 : Serial Laboratory Parameters Before and After Hemodialysis

	BUN	Cr	Na	K	Cl	HCO3	AG	pH	PaCO ₂	
ER	26	1.48	135	4.2	108	4	23	7.07	13	UAG 100.8 Uosm gap 204.5
4 hr			134	4.5	110	6	18	7.04	21	
12 hr	20	1.10	133	4.2	110	7	16	7.07	23	
Hemodialysis										
After HD			138	2.7	105	20	13	7.26	34	
Day 2	15	0.86	139	3.4	109	20	10	7.25	39	
Day 3	18	0.84	142	3.0	106	26	10			
Day 4	19	0.77	144	2.9	107	26	11			
Day 5	16	0.66	142	3.3	103	30	9			