



Timely Hemodialysis for Successful Treatment of Acute Salicylate Overdose in a Young Adult Female – A Case Report

Abstract

Salicylates are often used in clinical practice as antiplatelets as well as analgesics. Its overdose is not uncommon due to its easy availability over the counter. Mortality is high in severe cases when a lethal dose is consumed. Treatment of overdose is difficult due to the non-availability of an antidote. Hemodialysis is an underutilized treatment modality in such cases. We discuss here a case of a young female who presented to us 2.5 h after the consumption of a lethal dose of salicylate with symptoms of only tinnitus. She was successfully treated with two sessions of hemodialysis. Her drug levels on admission were remarkably high, and early hemodialysis was justified in view of high-dose consumption with minimal symptoms.

Keywords: Aspirin toxicity, hemodialysis, salicylate overdose

Introduction

Aspirin or salicylates are among the commonly used and trusted drugs in medical practice. It is extensively (90%) bound to albumin but can decrease by 30% in overdose. After ingestion, acetylsalicylic acid is rapidly hydrolyzed to salicylic acid. It has a low volume of distribution (0.2 L/kg), although higher values have been reported after overdose.¹ Due to its widespread use and easy availability over the counter, its toxicity is still an important problem in clinical practice. Many deaths have been reported in the past due to aspirin overdose;^{2,3} overall mortality is 0.01%, but it increases to 15% in severe toxicity.^{4,5} Due to the non-availability of an antidote, treatment can be a challenge, and the best treatment choice is enhanced elimination and prevention of further absorption. Activated charcoal is commonly used in this situation. We report an interesting case of salicylate consumption in a lethal dose that was treated successfully with prompt hemodialysis.

Case Report

A 25-year-old female was brought to the emergency 2.5 h after consumption of 70 tablets of Aspirin 0.5 g. She was fully conscious and complained of tinnitus on admission; however, she did not complain of

nausea, vomiting, vertigo, and breathlessness. Her physical examination was unremarkable. She was fully conscious, oriented in time space and person, moving all four limbs. There was no past history of any psychiatric illness. The patient was a known case of well-controlled hypertension on calcium channel blockers. Table 1 lists the parameters throughout the stay in the hospital.

The patient was started on activated charcoal. Her baseline investigations, including coagulation parameters, were unremarkable. She received intravenous sodium bicarbonate 1 meq/kg as bolus dose. The patient's urinary pH was 8.0. In view of the lethal-dose consumption of Aspirin and delay in the reporting of salicylate levels, she was started on hemodialysis by a high-flux dialyzer with a surface area of 1.9 m². She received two sessions of hemodialysis, each lasting 4 h on two consecutive days. She was observed closely for the development of new symptoms, and her biochemical parameters were monitored closely. Her condition stabilized with no new symptoms. Her routine biochemistry, including renal and liver function tests, was normal. Her blood Salicylate levels reported subsequently showed extremely high levels 35.5 mg/dL with gradual improvement after hemodialysis. She was discharged in stable condition after psychiatry opinion and counseling.

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Table 1: Laboratory data

Labs/Date	17/1/22	17/1/22	18/1/22	19/1/22	19/1/22
Salicylate levels (mg/dl)	35.5	30.8	17.9	10.7	0.49
HB/WBC/PLT	14.4/13.9/571				
Creat	0.5 mg/dL			0.6	
PT	1.11				
SGPT/SGOT	8/15		12/12		
Glucose	86				
Bilirubin	0.35		0.54		
Lactate	1.6			0.9	
Anion gap	7			8	

Discussion

The half-life of aspirin is short (~15 min) due to its rapid hydrolysis into salicylate. The normal elimination half-life is 2–3 h; however, it may extend up to 30 h in case of toxic dose consumption.⁶ It is metabolized in the liver and excreted by the kidney. Pharmacokinetics is unpredictable after overdose, and peak concentration may reach after 6 h, especially after consumption of enteric-coated tablets. Rivera *et al.*⁷ reported a case of delayed toxicity with the peak at 35 h. It is important to follow concentrations till they are steadily decreasing, and patients show no signs and symptoms of toxicity. Aspirin overdose can also lead to bezoar formation in the gut, which can lead to a space-occupying effect in the gastrointestinal tract, causing nausea, vomiting, and intestinal obstruction.⁸

Symptoms of Aspirin toxicity in the early stage are nausea, vomiting, tinnitus, and vertigo. Severe toxicity includes altered sensorium, pulmonary edema,⁹ coma, respiratory alkalosis, and hyperventilation. It can also cause arrhythmia such as sinus tachycardia due to acid–base and electrolyte imbalance.^{10–12} Other manifestations of toxicity include thrombocytopenia, platelet dysfunction, increased lactate levels, and hepatitis. Rarely, it can present as a focal neurological deficit as well.¹³ The therapeutic blood levels for Aspirin are 10–30 mg/dL, and levels that suggest severe toxicity are above 40–50 mg/dL.

In this case, the patient presented to us within 4–6 h, so the absorption may have occurred from the stomach by the time she reached the emergency room. However, she was treated with standard overdose protocol that included stomach wash and activated charcoal. Her anion gap was normal on admission as well as during stay, which is unusual in salicylate toxicity, but similar cases have been reported earlier due to increased chloride levels.¹⁴ Blood salicylate levels were sent periodically, but in view of lethal-dose consumption and the possibility of delayed reporting for levels, she was started on hemodialysis immediately by using a high-flux membrane. Hemodialysis in salicylate overdose is not a routine occurrence, and typical indications of hemodialysis in such situations are

altered mental status, pulmonary edema, acute kidney injury, severe acidosis, and high salicylate levels. In this case, hemodialysis was started early in view of lethal dose consumption and arrival in the emergency 2 h after consumption. Although salicylate levels indicate whether hemodialysis would be urgently needed, an informed clinical decision may be taken in circumstances where levels are not immediately available but other clinical data point toward severe toxicity. In salicylate toxicity, conventional hemodialysis is preferred over continuous renal replacement therapy (CRRT) because of better and faster clearance. Hemodialysis is efficient due to its low molecular weight of 138 Da (Aspirin: 180 Da) and lower volume of distribution (0.2 L/kg) of salicylate.¹² Fatal salicylate intoxication can occur after the ingestion of 10–30 g by adults. According to Fertel *et al.*, hemodialysis is often underutilized in these cases and should be done more often to offer the best standard of care for patients.¹⁵

Conclusion

The take-home message from this case is that hemodialysis is an effective modality to enhance the elimination of salicylates in case of severe toxicity and may be considered early before life-threatening complications supervene in patients with severe toxicity.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal.

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Conflicts of interest

There are no conflicts of interest.

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