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Article

Use of a Topical Salicylate Product Leading to Death: A Case Report

Ali Alshehri[1], Mohammad Albokhari[1], Bsaim Abdulsalam Altirkistani[2], Mouath Alshinqiti[1]

[1]Emergency Medicine Department, Ministry of the National Guard – Health Affairs, Jeddah, Saudi Arabia

[2]College of Medicine, King Saud bin Abdulaziz University for Health Sciences, Jeddah, Saudi Arabia

Corresponding: Bsaim Abdulsalam Altirkistani, Bsaim.altirkistani064@gmail.com OCRID: 0000-0002-6342-608X

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Abstract:

Introduction: Systemic salicylate poisoning can occur when products containing salicylates are applied to inflamed skin or when high concentrations are used for prolonged periods. Significant morbidity and mortality from dermal salicylate exposure are rarely reported. We present a fatal case of topical salicylate poisoning.

Case:

A 25-year-old female with vitiligo came to the emergency department by ambulance. Her sister reported that the patient had been using a topical skin whitening product for the preceding two weeks. We later found this to contain salicylate. She was critically ill, with abdominal pain, vomiting, and diarrhea. She received intravenous fluids and empirical antibiotics for suspected sepsis. Shortly after arrival, the patient suffered a cardiac arrest. Resuscitation attempts were unsuccessful. Antemortem blood testing revealed a salicylate concentration of 1055 mg/L (therapeutic range: 100–300 mg/L).

Conclusion:

This case highlights the potential for life-threatening systemic toxicity from topical salicylate use, particularly with prolonged application. Clinicians should maintain a high index of suspicion for salicylate poisoning in patients presenting with unexplained systemic symptoms and a history of topical product use.

Background:

Salicylic acid is a commonly consumed medication for various purposes, including its analgesic, antipyretic and anti-inflammatory effects. [1]. It is available not only in oral form but also as a topical agent [2,3]. Topical salicylic intoxication can occur as a result of increased absorption of such products when applied to inflamed skin and in several skin conditions, such as psoriasis and eczema [4]. In which these patients use such products to lessen their irritation status, and it is known as well in dermatology related conditions to use salicylate as keratolytic agents with various concertation.

In exceptional circumstances topical use can result in significant exposure as it accumulates in body with a half-life that can be as long as 12 hours in toxic circumstances [4]. We report a fatal case of topical salicylate poisoning in a 25-year-old woman using a product for skin whitening. The patient's family provided consent to publish this case.

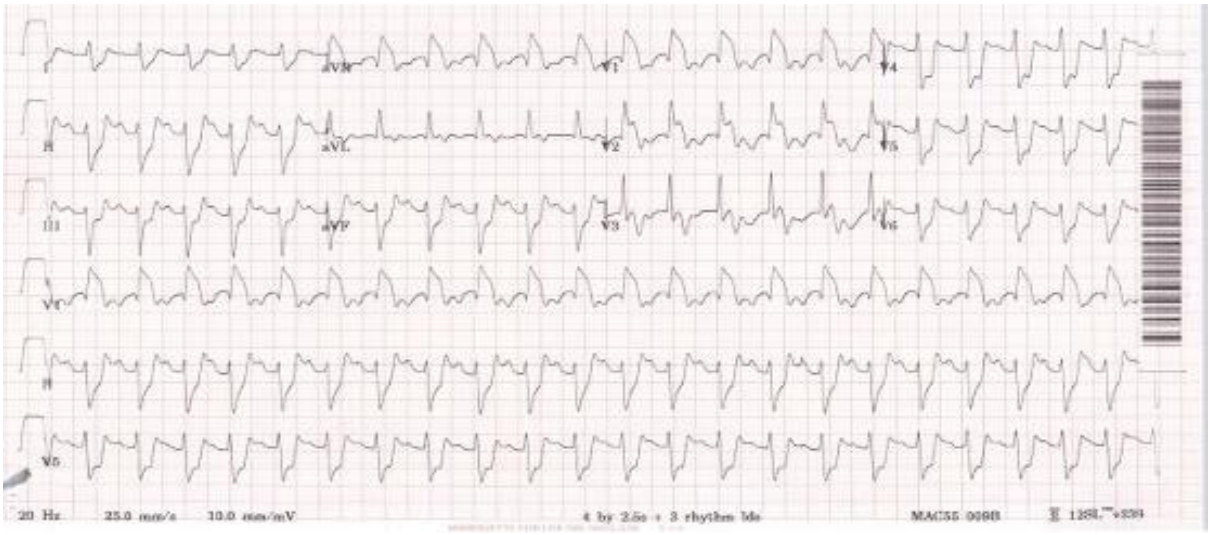

Figure 1. ECG of patient with life-threatening salicylate toxicity from a topical preparation revealed a broad complex QRS with a non-specific intraventricular conduction delay

Case Presentation:

A 25-year-old female with vitiligo arrived to the ED by ambulance. She was critically unwell, poorly responsive, tachypneic, and had increased work of breathing. Her blood pressure at presentation was 87/51 mmHg; heart rate 158 bpm; respiratory rate 30/min, temperature 40.1^{0}C, oxygen saturation 97% on room air, and glucose 7.3 mmol/L (131 mg/dL). She had bilateral equal air entry with no added sounds. Her abdomen was soft and non-tender. A rapid ultrasound for shock and hypotension exam revealed a hyperdynamic cardiac window with no signs of tamponade, collapsed inferior vena cava, and no free fluid in the lungs or abdomen. She received intravenous fluids and empirical antibiotics for suspected sepsis.

According to her sister, her abdominal pain began three days ago, predominantly in the epigastric region, which affected her sleep and was accompanied by vomiting and diarrhea. Her sister also reported that the patient had increased work of breathing and a fluctuating level of consciousness for the last day. There were depigmented patches all over the patient's body, and her sister mentioned the use of a specific topical product for vitiligo treatment. Additionally, the patient had been using another topical product from an unidentified source for the past two weeks for skin whitening. Patient consistently applied 20-30 mL of the unidentified source of the topical cream every other day. Later upon further history taking from her sister it was discovered that this product contained salicylic acid of unknown concentration. The source was unknown as she obtained it from neither a doctor nor a pharmacy.

An ECG revealed a broad complex QRS with a non-specific intraventricular conduction delay as well as it revealed ST elevation in aVR, V1, and V2, with reciprocal ST depression observed in all other leads, which is consistent with a state of hypoperfusion (Figure 1).

The venous blood gas analysis at presentation revealed a pH of 6.983, pCO_2 of 88.7 mmHg, and HCO_3 of 20.5 mmol/L (Table 1). She underwent immediate intubation and hyperventilation to reduce pCO_2 and to correct acidosis. A nasogastric tube insertion revealed "coffee ground" aspirate.

Blood tests revealed an anion gap of 25 (reference range: 7-15 mmol/L) and lactate of 3.92 (reference range: 0.7-2 mmol/L). White blood cells were elevated 20 x10^9/L (reference range: 4.0-11.0x10^9/L) as were platelets 624 (150-400x10^9/L) and C-reactive protein 40.7 (reference range: 0-5 mg/L).

Shortly post intubation, the patient experienced an asystolic cardiac arrest. The cardiopulmonary resuscitation attempt included a total of 6 mg of epinephrine, a total of 2 L of intravenous fluid, 4 units of packed red blood cells, dextrose 50% with a dose of 25 grams/50mls IV, 100 mmol sodium bicarbonate, and 1 g IV calcium chloride. After 40 minutes of continuous CPR, the patient was pronounced dead by the attending emergency physician. The salicylate concentration results after arrest was 1055 mg/L (therapeutic range 100 – 300 mg/L).

Table 1. Blood gas analysis on arrival and prior to cardiac arrest following topical salicylate poisoning.

Parameters	Reference	Value at presentation	Value at arrest
pH	7.35-7.45	6.983	7.221
pCO_2	32-45 mmHg	88.7	26.3
HCO_3	20-24 mmol/L	20.5	10.5
Hemoglobin	11.5-16.5 g/dL	9.1	12.4
Sodium	135-144 mmol/L	142.4	142.7
Potassium	3.5-4.9 mmol/L	5.34	5.51
Calcium	2.11-2.54 mmol/L	0.95	1.00

Discussion:

Salicylates toxicity can result from various sources, including migraine medications, herbal remedies, and teething gels for infants [5-8]. Additionally, topical salicylate intoxication can occur when the recommended dermatological amounts are exceeded [8-9].

Topical salicylates are commonly used for conditions such as warts, plaque psoriasis, actinic keratosis, acanthosis nigricans, and tinea nigra, with recommended concentrations ranging from 5% to 40% [10]. However, even at lower concentrations, systemic toxicity can occur. For example, topical application of 6% salicylic acid to 40% of the body surface area can result in toxicity or death [8]. Madan and Levitt (2014) reviewed 25 published cases of salicylate toxicity following topical application for various skin conditions [8]. None of these cases involved patients with vitiligo, and only two were fatal.

Factors influencing the rate of percutaneous salicylate absorption include the degree of skin inflammation, hydration of the stratum corneum, and the solvents used [6,8]. Notably, skin inflammation – often the indication for topical salicylate use – increases percutaneous penetration. Salicylic acid also directly enhances the permeability of the stratum corneum [8].

In our case, the surface area of use, the two-week duration of use, and the salicylate content of the product were key contributing factors. Based on the available information, we found no evidence of oral salicylate ingestion. While vitiligo may alter skin structure, it is uncertain whether it increases skin permeability to salicylate.

Conclusion:

Topical salicylate intoxication is rare but can result in fatal outcomes, particularly with prolonged use or application to large surface areas. This case highlights the importance of recognizing systemic toxicity in patients using topical salicylate products, even in the absence of oral ingestion. Clinicians should maintain a high index of suspicion for salicylate poisoning in patients presenting with unexplained systemic symptoms and a history of topical product use.

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