

## Reminder of important clinical lesson

## Salicylate toxicity from ingestion of traditional massage oil

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**Summary**

A 16-month-old child developed a brief generalised tonic–clonic fitting episode and vomiting at home, after accidental ingestion of traditional massage oil. As the patient presented with clinical features of salicylate toxicity, appropriate management was instituted. He was admitted to the intensive care unit for multiorgan support. The child was discharged well 1 week after the incident. Methyl-salicylate is a common component of massage oils which are used for topical treatment of joint and muscular pains. However, these massage oils may be toxic when taken orally. Early recognition of the salicylate toxicity is very important in producing a good patient outcome.

**BACKGROUND**

Throughout history massage oils have been regarded as a most precious medium for healing and spiritual work. Among these massage oils include almond oils, jojoba oils and the wintergreen oil. Wintergreen oil is extracted from steam distillation of leaves of *Gaulthreia* species of plants. Its active ingredient, methyl-salicylate, has made it a popular massage oil to treat joint and muscular pains. However, excessive usage of methyl-salicylate as a topical product can be dangerous<sup>1</sup> and its oral ingestion can be disastrous.<sup>2–4</sup>

**CASE PRESENTATION**

A 16-month-old Malay boy was brought to the emergency department (ED) after accidental ingestion of traditional massage oil. He was well before the incident, with no significant antenatal, birth or postnatal histories. The patient had mistakenly drunk it when he mistook it for a beverage. There were no witnesses to the incident, therefore the quantity of ingested oil was unknown. His mother noticed that he vomited twice at home after the ingestion. Around half an hour later, the child developed generalised tonic–clonic fit, which spontaneously aborted after a few seconds.

On arrival to the ED, the child was lethargic looking and moderately dehydrated. He was not responsive to call. His respiratory rate was 40 breaths per minute, blood pressure and pulse rate was 80/45 and 140 per minute, respectively. Pulse oxymetry measured a saturation of 98% on face mask of 10 liters per minute of oxygen. His rectal temperature was 37.8 °C. His anterior fontanelle was normal. Cardiac, pulmonary and abdominal examinations were unremarkable. There was generalised hypotonia, and both pupils were equal and reacting to light.

**INVESTIGATIONS**

His arterial blood gases (ABG) on 100% oxygen revealed a pH of 7.39, pCO<sub>2</sub> 21.9 mm Hg, pO<sub>2</sub> 293 mm Hg, HCO<sub>3</sub><sup>-</sup> 16.3 mmol/l and a base excess of -11.6. Serum electrolytes were: sodium, 137 mmol/l; potassium, 3.8 mmol/l; chloride, 106 mmol/l; urea, 8 mmol/l. A random blood

glucose level was 6.6 mmol/l (118.8 mg/dl). His initial blood salicylate concentration taken from the ED was 112.15 mg/dl.

**TREATMENT**

The child was intubated with an uncuffed endotracheal tube of size 4.5 mm for airway protection, and fluid resuscitation was started. He was admitted to the intensive care unit (ICU) for close observation. The child was given 1 g per kg body weight of activated charcoal 2 hourly, intravenous frusemide of 1 mg/kg and intravenous bicarbonate. At 4 h after admission, the repeat blood salicylate concentration was 98.7 mg/dl. Haemodialysis was started in the ICU.

There were no more fitting episodes throughout his stay in the ICU. His ABG gradually improved. Serial blood salicylate concentration showed a reducing trend, and after 3 days, blood salicylate concentration was zero. His conscious level also improved after 24 h. He was stable haemodynamically, and was extubated 3 days after admission. The patient was discharged from the ICU 1 week later.

**OUTCOME AND FOLLOW-UP**

A visit to the clinic 1 month after the incident revealed a healthy and cheerful boy.

**DISCUSSION**

The application of salicylates can be grossly divided into aspirin and non-aspirin salicylates. The latter, such as methyl-salicylate, is found in many over-the-counter brands of creams, ointments, lotions, liniments and medicated oils intended for topical application to relieve musculoskeletal aches and pains. However, the clinical manifestations and management of all salicylate intoxications are similar.

Small doses of salicylate are rapidly conjugated with glycine to form salicyluric acid, which is excreted in the urine. However, this biotransformation pathway is saturable.<sup>5</sup> The usual therapeutic range of plasma salicylate concentration is between 10 and 30 mg/dl. Most patients exhibit signs of intoxication when the plasma level exceeds

**Table 1** Examples of non-prescription methyl-salicylate-containing medications\*

Products	% Methyl-salicylate
Oil of wintergreen	98
Icy Hot Extra Strength Cream	30
Bayer Muscle Joint Strength Cream	30
Muscle Ryb Extra Strength Cream	30
Ben-Gay Extra Strength Cream	30
Tiger Balm Liniment	28
Ben-Gay Original Cream	18.3
Pain Bust-R ii Ointment	17
Thera-Gesic Cream	15
Banalg Hospital Strength Lotion	4.9
Red Flower Oil	67
White Flower Medicine Oil	40
Tiger Oil	38
Kwan Loong Medicated Oil	15

\*From information found in <sup>9</sup>.

40–50 mg/dl.<sup>6</sup> Severe salicylate poisoning is usually associated with plasma salicylate concentration of 70 mg/dl or more. The acutely toxic dose of aspirin is generally considered greater than 150 mg/kg of body mass,<sup>7</sup> and a potentially lethal dose is greater than 500 mg/kg.<sup>8</sup>

The severity of ingesting methyl-salicylate depends on the amount and on the preparation of the oil. There are many commercially available methyl-salicylate-containing compounds in the market (table 1). Most of them are non-prescription medications.

The strongest concentration of methyl-salicylate is found in the oil of wintergreen, which has 98% methyl-salicylate. One teaspoon (5 ml) of wintergreen oil contains the equivalent of approximately 5 g of salicylate. This clearly indicates that ingestion of very small volume of this product has the potential to cause severe toxicity.<sup>10</sup>

The toxicity features depend on the drug formulation and dosage, patient's age and the acuity of ingestion. The clinical features are summarised in table 2. Although the classical signs of salicylate poisoning consist of the triad of hyperventilation, tinnitus and gastrointestinal irritation, the patient's presentation may vary depending on the time of presentation after ingestion.<sup>11</sup> However, a high index of suspicion is necessary, with prompt recognition of clinical signs and symptoms, as early treatment can prevent organ damage and death.<sup>12</sup>

Treatment of salicylate poisoning is aimed at removal of drug via gastric and renal route, replacement of fluid and electrolytes and correction of acid–base abnormalities.

**Table 2** The clinical features of salicylate toxicity

Mild-to-moderate toxicity	Severe toxicity
Nausea	All symptoms of mild-to-moderate toxicity
Vomiting	Hypotension
Fever	Confusion
Dehydration	Comatose
Hyperventilation	Seizures
Electrolyte disturbances	Pulmonary oedema
Tachycardia	Cardiac arrest
Deafness	
Tinnitus	
Metabolic acidosis	

Activated charcoal absorbs methyl-salicylates effectively, reducing the peak salicylate concentration by up to 40–50% when given up to 1 h post-ingestion.<sup>13</sup>

Urine alkalinization should be undertaken in patients with a plasma salicylate concentration of more than 500 mg/l, particularly if acidosis is present. The therapeutic aim is to make the urine alkaline (ideally pH 7.5–8.5), and in adults this may be achieved by administration of sodium bicarbonate.<sup>14</sup>

Hypokalaemia should be corrected before administration of sodium bicarbonate, because this lowers the serum potassium concentration further. Haemodialysis is the most efficient method of removing salicylates from the blood. Dialysis is the treatment of choice in salicylate-intoxicated patients who have severe renal, hepatic or cardiovascular disorders, uncorrected acidosis, comatose, seizing or are unresponsive to other methods of treatment.<sup>15</sup>

### Learning points

- ▶ Identification of salicylate poisoning is extremely vital to ensure that the appropriate management can be given.
- ▶ The management will depend on the severity of poisoning, which may vary from conservative management to dialysis.
- ▶ Physicians and the public should also be aware of the potential risks of topical medications, especially over-the-counter medications that contain methyl-salicylate.

**Competing interests** None.

**Patient consent** Obtained.

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