Case Report

A Fatal Case of Benzyl Benzoate Poisoning

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Abstract : **We present a case of benzyl benzoate ingestion in a 38 years old Thai woman whose presenting symptom was coma and severe metabolic acidosis. The amount ingested was 360 ml of 25% W/V benzyl benzoate. It did not contain any alcohol or acid substance. Standard textbooks and other reference books do not mention severe symptoms caused by ingestion of this substance and gastric lavage is the only recommendation. Should there be another method used to induce elimination of benzyl benzoate-hemodialysis?**

เรื่องย่อ : **รายงานผู้ป่วยหนึ่งรายเสียชีวิตจากการกินยาฆ่าหิดเบนซิลเบนโซเอต**

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สารศิริราช 2544; 53: 231-235.

ยาฆ่าหิดเบนซิลเบนโซเอตเป็นยาทาภายนอกที่นิยมใช้ในโรงพยาบาลมาเป็นเวลานานเนื่องจากเชื่อว่าไม่เกิดอันตรายจากการดูดซึมยาทางผิวหนัง อันตรายที่เกิดจากการใช้ผิดวิธี เช่นการดื่มกินสารดังกล่าวเคยมีรายงานการเกิดความผิดปกติในสัตว์ทดลอง แต่ยังไม่มีรายงานอย่างเป็นทางการถึงความผิดปกติในมนุษย์ ผู้ป่วยรายนี้ได้รับสารดังกล่าวโดยการดื่มกิน ทำให้เกิดภาวะความผิดปกติของไตและเกิดภาวะเลือดเป็นกรดอย่างรุนแรง คณะผู้รายงานได้ทำการรักษาผู้ป่วยด้วยวิธีฟอกโลหิต (hemodialysis) โดยมีจุดประสงค์เพื่อลดระดับความเป็นพิษของสารนี้และลดความเป็นกรดในเลือดในเวลาเดียวกัน โดยอาศัยความเป็นไปได้ของการรักษาพิษจากสารนี้ในแง่มวลสารและโครงสร้างเปรียบเทียบกับสารซาลิซาเลตและสารโทลูอีน ซึ่งเป็นที่ยอมรับแล้วในทางปฏิบัติที่ผู้ป่วยที่เกิดพิษจากสารทั้งสองควรได้รับการรักษาด้วยวิธีฟอกโลหิต

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INTRODUCTION

Benzyl benzoate has been used in Thailand for a very long time for killing lice. The topical use of this substance has been claimed to be nontoxic but there has never been any report on its toxicity from ingestion. The standard textbook classifies benzyl benzoate as an antiseptic and gastric lavage is recommended when accidental ingestion occurs. No pathway for the metabolism of this substance has been published previously. Hippuric acid may be the end product of its metabolism. In animals, ingestion of benzyl benzoate produced progressive incoordination, central nervous system excitation, convulsion and death[1].

CASE REPORT

A 38 years old Thai woman was admitted to Siriraj Hospital in a semiconsciousstate for 12 hours on March 12, 2001. The patient has been diagnosed with schizophrenia and been on monthly perphenazine (intramuscular) 4 ml, haloperidol 5 mg per day, benhexol 4 mg per day and diazepam 4 mg per day. Twenty hours before admission, she ingested 360 ml of 25%W/V benzyl benzoate which was prescribed for killing lice. Twelve hours before admission she became confused and had hallcinations.

On admission, the patient's height was 165 cm and her weight was 65 kg. Her body temperature was 37°C , blood pressure 110/70 mmHg, pulse rate 120/min, and respiratory rate 40/min. She was unconscious but responded to painful stimuli with normal muscle tone. No neck stiffness or kernig's sign, pupil size and fundi were normal, liver and spleen were not palpable and no abnormal sounds were heard in both lung fields.

Hematological values were as follows: hematocrit 46 percent, hemoglobin 15.3 g/dl, white blood count 30,200/mm^3 with 87.8% neutrophils, 3.9% lymphocytes, and platelet count 333,000/mm^3. Serum ketones were not found, BUN was 4 mg/dl and creatinine level was 0.7 mg/dl. CPK was 12,931 U/L and LDH was 1,440 U/L.

Electrolyte values were as follows: Na 137 mEq/L, K 5.6 mEq/L (hemolysis 1+), Cl 105 mEq/L, HCO^-_3 6 mEq/L. Arterial blood gas was presented as follows: pH 7.129, PO_2 24.50, PCO_2 37, HCO^-_3 8.2, O_2 Sat 98.1%, FIO_2 1.0.

Urinary values were as follows: pH 5, sp.gr. 1.025, albumin 1+, sugar 4+, ketone 3+, WBC 3-5/HPF, RBC 5-10/HPF, hyaline cast 1-2/LPF, granular cast 2-3/LPF. Urine myoglobin was not found.

Chest X-ray was normal and ECG showed sinus tachycardia, with no QRS widening or prolonged QT interval.

Blood for toxic substance screening test: salicylate 15 mg/L.

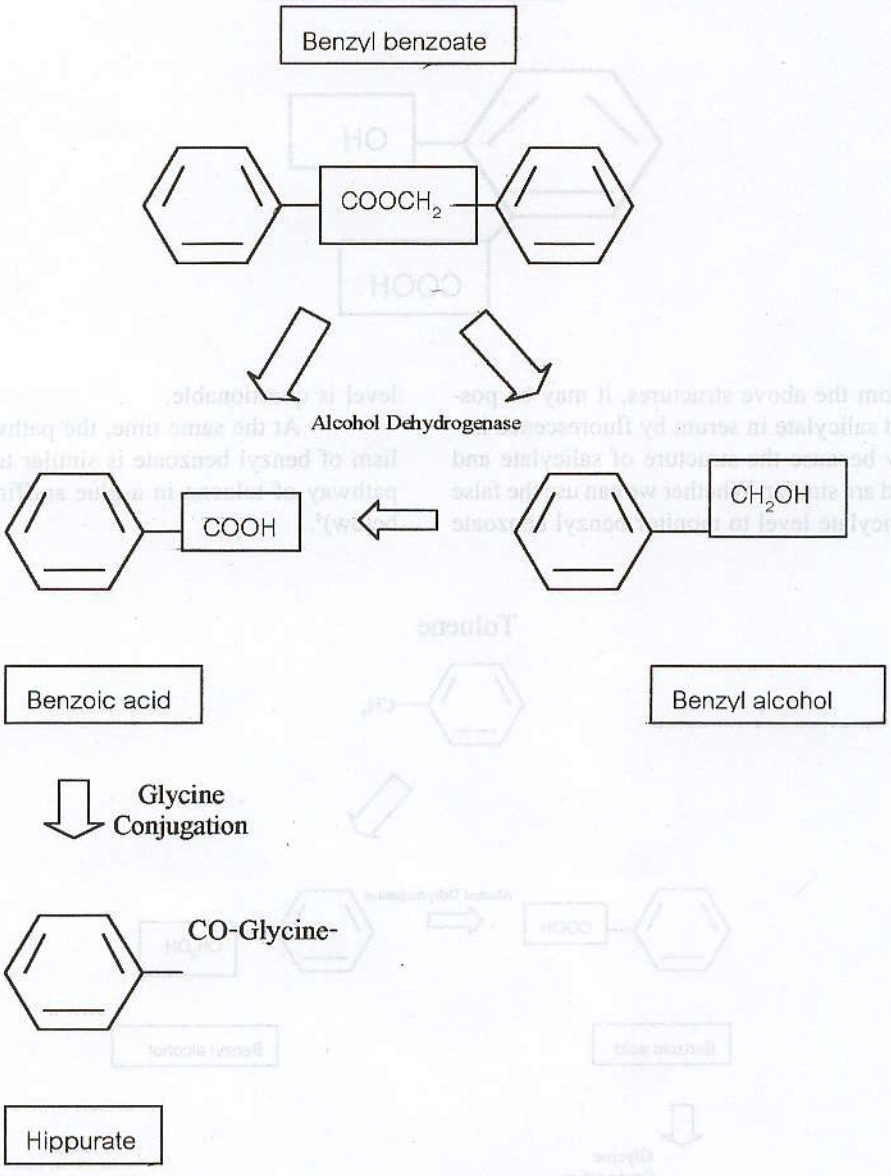
Substance confirmed laboratory : no ethanol, no salicylate in benzyl benzoate preparation.

The patient was admitted to the ICU and placed on a ventilator. Intravenous fluid and sodium bicarbonate were used to control severe metabolic acidosis. Intermittent hemodialysis was discussed for supportive treatment of the rhabdomyolysis, acute renal failure, and hyper-metabolic state in this patient. After a week of hemodialysis, the patient was extubated and moved to an ordinary ward. In second week, she developed fever and sputum culture revealed Acetobacter bacteria which was resistant to all antibiotics. She died during the third week of admission. No autopsy was performed.

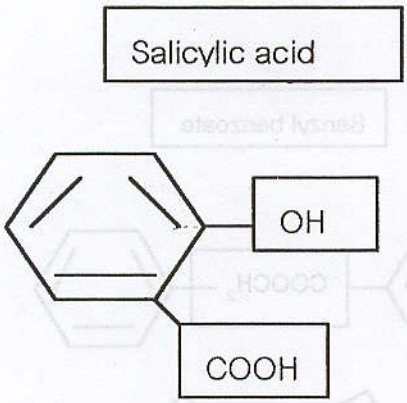
DISCUSSION

Standard textbooks recommend only gastric lavage for benzyl benzoate ingestion and do not give any information about toxicity in humans. We found severe metabolic acidosis and rhabdomyolysis in this case and attempted to manage it by standard treatment. At the same time, we were looking for another possible way to define this substance and explain why salicylate levels were positive in this patient. We would like to explain how to use hemodialysis to induce elimination of benzyl benzoate in this case, using the same criteria as in the treatment of toluene plus salicylate poisoning.

Chemical structures:

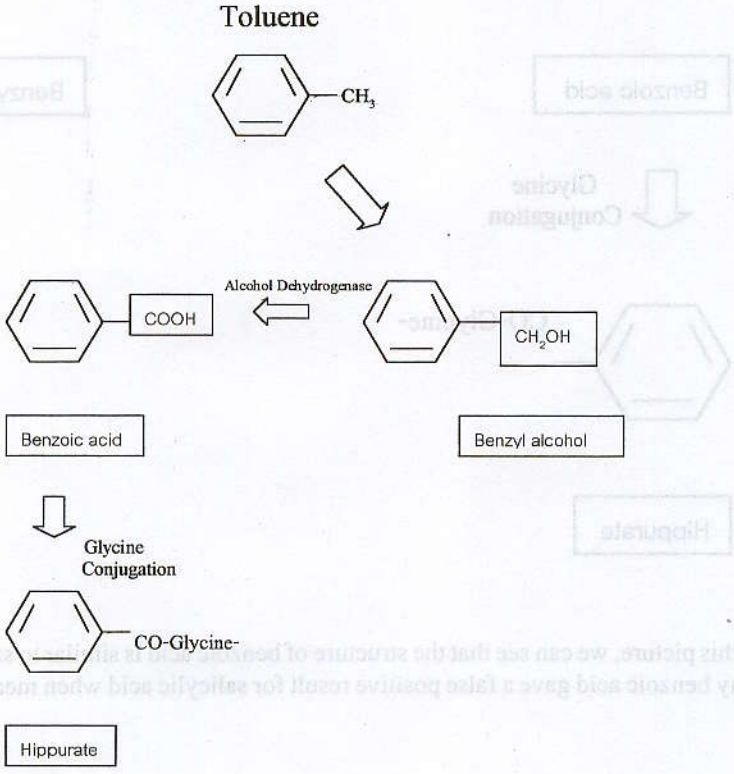


From this picture, we can see that the structure of benzoic acid is similar to salicylic acid (below). This may explain why benzoic acid gave a false positive result for salicylic acid when measured by the fluorescence technique.



From the above structures, it may be possible to find salicylate in serum by fluorescence immune assay because the structure of salicylate and benzoic acid are similar. Whether we can use the false positive salicylate level to monitor benzyl benzoate level is questionable.

At the same time, the pathway of metabolism of benzyl benzoate is similar to the metabolic pathway of toluene in a glue sniffing case (shown below)[4].



While we use hemodialysis for the treatment of salicylate poisoning, we may also use it in this case by the criteria of similar molecular weight of benzoic acid and the elimination of hippurate (final metabolite) similar to that found in toluene poisoning.

The increased anion gap metabolic acidosis may be explained by increased benzoic acid in the serum. There has been human report of 99-234 mg/kg/day of benzyl alcohol ingestion producing increased anion gap metabolic acidosis, changes in consciousness, central nervous system depression, hypotension, renal failure and convulsions[2]. Severe metabolic acidosis and rhabdomyolysis were reported in this case which could not be explaind by other mechanisms, except it might occur as a result of toxicity.

Hemodialysis was applied in this case by using the criteria for treatment of acute renal failure, hypermetabolic state and rhabdomyolysis. Animal studies of the metabolites produced following benzyl benzoate ingestion will be performed in the future in order to confirm our hypothesis and to suggest the specific treatment in this case.

References

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