

'Water poisoning' in burn patients drinking tap water: case report

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Abstract

Two toddlers with major burns are described who were seen in primary healthcare clinics and sent home. Both children drank large amounts of tap water and presented a few days later with severe hyponatraemia and seizures ('water poisoning'). Indications for admission and early fluid management of burn patients are summarised.

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Patient 1

A 22-month-old girl sustained hot water burns to both legs, the abdomen and the back up to a total surface area of 35%. She was initially seen in a primary healthcare (PHC) clinic where the burns were assessed as superficial partial thickness and dressed. The patient was subsequently sent home. Three days later she presented to the regional hospital with seizures and fever. Routine blood tests revealed a severe hyponatraemia of 121. After correction of the hyponatraemia the child was referred to the provincial burns unit, where the burns were reassessed as deep partial thickness and subsequently excised and grafted. On inquiry the mother said that the child had been very thirsty and she had given her tap water to drink.

Patient 2

An 11-month-old boy was burned when a container of hot water fell off a table under which he was playing. He sustained 18% burns to the back and the dorsum of both arms. The child was assessed in the local PHC clinic where the burns were assessed as superficial partial thickness. They were dressed with silver sulfadiazine and the child was sent home. A few days later he presented to the district hospital with seizures and clinical signs of pneumonia. Blood investigations revealed a sodium level of 123. The mother said that the child had been drinking tap water. The child died within 24 hours of admission.

Discussion

Burns are a common injury in both adults and children, and the PHC nurse may be the first healthcare practitioner to see and institute treatment of these patients. Proper assessment of the extent and depth of the burn wound is notoriously difficult even for experienced paramedics and doctors. However, the nurses that assessed the two patients discussed here, assessed the body surface area burnt correctly, but then instituted incorrect treatment. Although the assessment of the burn depth in the first patient differed between the PHC nurse (who assessed the wounds as superficial partial thickness) and the burn specialist (who assessed them as deep partial thickness), this does not always imply an assessment error on the part of the nurse, as burn wounds may 'progress' over time.

Fluid management plays an important role in the early management of the burn patient. The patient with a significant burn loses large amounts of plasma both through the burn wound into the dressings and through 'leaky capillaries' into the tissues. It is estimated that an adult with a burn of more than 15% of his/her total body surface area, a child (two to ten years of age) with a burn of more than 10%, or an infant (< two years old) with a burn of 5% or less need in-hospital fluid resuscitation, usually in the form of IV fluids. In addition to their maintenance fluids the first child would have needed 2.8 litres of fluid and the second child 1.1 litres (4 ml/% TBSA/kg body weight).¹ Because plasma is

more than just water, it is important that other constituents of plasma are replaced as well. One of the most important of these is sodium.

Although most patients with significant burns receive their resuscitation fluids through an IV line, this is not essential; they can be given orally, either per mouth or via a nasogastric tube.² This is particularly recommended in situations of mass incidents, but may also be an option when a PHC nurse fails to put up a drip in a severely burned patient. Again, it is of vital importance that these fluids are a combination of water and sodium, such as in the form of oral rehydration solution or of a sports drink, as illustrated by the two case reports. Both children, each of which had an indication for admission and in-hospital fluid resuscitation, were sent home without any advice regarding fluid management. The result was that they drank large amounts of tap water, which does not contain sodium, and presented several days later with severe and life-threatening hyponatraemia.

Hyponatraemia is a common cause of seizures in children with burns, and is particularly common in children under three years old.³ Young children in particular are prone to develop hyponatraemia if they are given hypotonic resuscitation fluids.⁴ Tap water is the ultimate hypotonic solution and should be avoided in the resuscitation of patients with severe burns.

By way of conclusion, there are lessons to be learned:

1. Infants with burns over 5%, children with burns over 10% and adults with burns over 15% of their total body surface should be admitted for in-hospital resuscitation, no matter what the depth of the burn is.
2. Burns resuscitation is best achieved via the intravenous route, but oral fluids are acceptable if the former is not available.
3. Oral rehydration fluid or sodium-containing sports drinks should be used for oral resuscitation of burns in quantities calculated with Parkland's formula (4 ml/kg/STBSA – see reference 1 for details).

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