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Intoxication by bleach ingestion

To the Editor:

Intoxication by bleach ingestion causes mainly gastrointestinal irritation and ear, nose and throat lesions. Usually bleach ingestions are benign, leading most toxicologists to advocate ambulatory conservative management. Rare case reports of fatal bleach ingestions with hypernatremia and hyperchloremia have been reported.¹ Chemical adult respiratory distress syndrome (ARDS) has been reported following ingestion of numerous agents such as organic solvents, fluoride or chlorine containing solutions. We present a case of ARDS following bleach ingestion and discuss the unique mechanism of bleach induced lung injury.

A 33-yr-old woman was admitted to the emergency department following an assault with sodium hypochlorite; presumably, she aspirated bleach. She presented without respiratory symptoms, a respiratory rate of 18 breaths·min⁻¹, a saturation of 97% under room air. The first chest *x-ray* performed two hours after intoxication (Figure 1A) showed a bilateral bi-basal infiltrate suggestive of aspiration pneumonia. Initial biochemistry showed a sodium of 139 mmol·L⁻¹, a potassium of 3.8 mmol·L⁻¹ and a chloride of 107 mmol·L⁻¹ and liver tests were normal. Complete blood count showed a white blood cell of 17.8 G·L⁻¹ with 75% neutrophils, 10% stab forms, vacuolated neutrophils with toxic granules.

Her respiratory status rapidly deteriorated and required ventilatory support. The chest *x-ray* (Figure 1B) showed progression to an ARDS which worsened during the next 24 hr. Evolution was marked by slow

FIGURE Chest *x-ray* at admission (A) and six hours later (B). The initial bi-basal infiltrate suggestive of aspiration developed in a respiratory distress.

recovery requiring 26 days of mechanical ventilation. There was no hypernatremia or hyperchloremia.

Bleach is a potent oxidant and has been used as a trigger for experimental lung injury. Infusion of sodium hypochlorite in an isolated rabbit lung induces a depletion of reduced glutathione.² This oxydative stress on pulmonary neutrophils triggers an endothelial response with increased pulmonary artery pressure, increased alveolar permeability and ARDS.³ Although rabbit models involved perfusion of the lungs with hypochlorite containing perfusate, aspiration of bleach could also induce an alveolar neutrophil oxydation and ARDS.

Bleach is also a strong reagent in acids: ingestion of sodium hypochlorite reacts with gastric hydrochloric acid to form chlorine gas. Very small amounts of inhaled chlorine may cause acute lung injury: in rats, exposure to 500 ppm of chlorine during ten minutes, is able to reverse the alveolar fluid shift from absorption to massive translocation.⁴ Microvascular permeability increased by 150% and extravascular lung water doubled.

Aside ENT and gastrointestinal irritation, clinicians should be aware of the unique direct and indirect pulmonary toxicity of this common household product.

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Cerebral infarction following carotid arterial injection of adrenaline

To the Editor:

Neurological injury following internal jugular venous cannulation has been reported frequently.^{1–5} We report a case where the injection of adrenaline into the carotid artery led to cerebral infarction.

A 24-yr-old female diagnosed with septic shock was being sedated, ventilated and required high inotropic/vasopressor support. During a routine check of her right internal jugular venous catheter (her only *iv* access), it wasn't possible to aspirate blood and so all infusions were stopped. Following left sided 'internal jugular vein' cannulation (fixed at 13 cm) the patient had a run of premature ventricular contractions, which led to ventricular fibrillation. As a part of the cardiopulmonary resuscitation, three rounds of adrenaline were injected and a pressurized infusion of Hartmann's solution started through this new '*iv*' access. Following successful resuscitation after about ten minutes, blood was seen to flow-back into the infusion drip. A suspicion of our '*iv*' catheter, actually being intra-arterial, arose. The line was transduced and an arterial waveform confirmed our suspicion. The right femoral vein was then cannulated, the 'intra-arterial' catheter removed and the site firmly pressed for a few minutes.

A neurological examination performed six hours later demonstrated exaggerated right-sided deep tendon reflexes with a positive Babinski's sign. A computed tomography scan of the head revealed a diffuse ischemic infarction of the left frontal and parietal regions. Bedside echocardiogram and Doppler studies of the left carotid artery were done to rule out the presence of any thrombus or atheromatous plaque. Despite aggressive management, the patient deteriorated and died after about 24 hr of the episode. There was no evidence of any thrombus/emboli on autopsy.

As the known causes of neurological injury, in this scenario, were not obvious, we suppose it was the adrenaline injected during resuscitation that caused a

transient constriction of the carotid artery and/or its branches. This vasoconstriction, maintained by repeated injections of adrenaline, compounded by the compromised circulation (produced by external cardiac compressions), led to ischemic infarction of the brain. If our assumption, based on available evidence, is correct, it raises a few significant questions; how justified is it to attempt a central venous line placement (specially internal jugular) in a patient who is severely hypotensive or 'in cardiac arrest'? Would the use of a 2D ultrasound be useful in such 'resuscitation scenarios'? We would appreciate comments from other readers, if they can suggest any other possible cause and/or solutions for this catastrophe.

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Erratum

Dans l'article intitulé: "The posterior lumbar plexus (psoas compartment) block and the three-in-one femoral nerve block provide similar postoperative analgesia after total knee replacement [Le bloc du plexus lombaire par voie postérieure (loge du psoas) et le bloc du nerf fémoral trois-en-un produisent une analgésie similaire après une arthroscopie totale du genou]" publié dans le numéro de Janvier 2004, *Can J Anesth* 2004; 51: 45–51, le terme "arthroscopie" dans le titre français devrait se lire "arthroplastie".