

## LETTER TO THE EDITOR

### A not so rosy picture: accidental intravenous injection of rose-tinted pourable chlorhexidine solution



Dear Editor,

Chlorhexidine is a routinely-used broad spectrum antiseptic for hand disinfection and surgical site preparation. Although perioperative allergic reactions to chlorhexidine preparations are frequently discussed, toxicity due to its accidental intravenous injection is sparsely reported. We recently encountered a case of accidental intravenous injection of chlorhexidine gluconate in a patient posted for coronary artery bypass surgery when after uneventful induction of anesthesia, the surgeon started preparing the right groin for IABP insertion, simultaneously with central line insertion by the anesthetist and accidentally kept the gallipot containing almost colorless chlorhexidine solution for surgical site preparation on the sterile tray meant for central venous catheter insertion (Fig. 1A). The anesthetist, mistaking the same as heparin-saline solution, inadvertently injected undiluted 2 mL (40 mg) of chlorhexidine gluconate solution intravenously while flushing a central venous catheter port, without any adverse consequences to the patient. Though no perioperative adverse event was reported, it led us to perform a literature search for accidental intravenous injection of chlorhexidine gluconate.

Using “intravenous/intravascular chlorhexidine”, “accidental intravenous chlorhexidine injection” as key words in PubMed/Medline, Scopus, EMBASE, and Google, we identified four papers describing the same. We would like to brief the readers about possible circumstances of error, complications, and management of accidental intravenous chlorhexidine injection. Ishigami et al.<sup>1</sup> described a patient in whom 800 mg chlorhexidine gluconate (4 mL of 20% solution) was accidentally injected instead of a muscle relaxant. The patient developed acute respiratory distress syndrome (ARDS) despite plasma exchange therapy and subsequently required venoarterial extracorporeal membrane oxygenator (ECMO) support for recovery. Ploner et al.<sup>2</sup> accidentally injected 10–15 mL

of 0.1% chlorhexidine gluconate mouthwash (10–15 mg) meant for dipping transesophageal echocardiography (TEE) probe, into central line when a wrong syringe was loaded in infusion pump, with uneventful recovery. Johner et al.<sup>3</sup> inadvertently injected chlorhexidine gluconate solution into radial artery catheter, resulting in necrosis of the thumb requiring surgical debridement and arthrodesis of the thumb phalanges. Kudo et al.<sup>4</sup> identified accidental intravenous injection of 10 mL of 20% chlorhexidine gluconate in central line port postoperatively as the cause of death of a 58-years-old woman who underwent synovectomy of her left middle finger. Apparently the on-duty nurse presumed the 20% chlorhexidine solution prepared for another patient with diabetic gangrene to be heparin saline solution used for routine central line flush while injecting the same.

Clinical features of accidental chlorhexidine intravenous injection may vary from mild urticaria with topical exposure to systemic anaphylaxis with parenteral exposure in central venous catheters. The commercially available specific diagnostic IgE analysis for chlorhexidine (ImmunoCAP Allergen C8, Sweden) has a cutoff value of 0.35 kUA/L.<sup>5</sup> Management is essentially supportive with volume resuscitation, steroids, antihistaminic, inotropes/vasopressors, ventilatory support, plasma exchange, and lastly ECMO.

In all the cases including ours, the incident could be attributed to faintly tinted/colorless pourable chlorhexidine solution, which was indistinguishable from heparin saline/normal saline solution intended for use on visual inspection (Fig. 1B). In the case reported by Ishigami et al.,<sup>1</sup> however, the unintentional administration occurred because the name of the muscle relaxant used was similar to the commercial name of chlorhexidine gluconate and the two containers were in close proximity. The present research report highlights a potentially lethal preventable toxicity in clinical practice which can improve patient safety. The take home message is: open systems as use of gallipots for injectable drugs should be discarded, only highly tinted/colored skin antiseptic preparation solutions of chlorhexidine should be available within the sterile surgical field, ISO labelled syringes should be available for parenteral use, and sterile labelling should be used in surgical field.

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**Figure 1** A, two gallipots placed side by side, one with indistinct pourable 2% chlorhexidine gluconate with alcohol solution (with needle), the other with heparin saline solution with 2 mL of solution drawn from the corresponding gallipot in each syringe below it. B, normal saline (extreme left), 0.5%, 2%, and 4% (extreme right). Chlorhexidine gluconate solutions (3M, Avagard, with each solution poured in an open gallipot, and 2 mL of it drawn in the syringe placed directly below it).

### Conflicts of interest

The authors declare no conflicts of interest.

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