American Journal of Therapeutics 18, e86–e88 (2011)

Allergy to Lactated Ringer Solution—An Unusual Case Presentation

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Allergic reactions may be noted by an anesthesiologist during various stages of anesthesia that include induction, maintenance, and post anesthesia care. The incidence of allergic reactions is most common in the perioperative period as a result of various drugs being used concomitantly. It is of paramount importance that an allergic reaction be rapidly diagnosed and adequately treated, because anaphylaxis and acute allergic reactions can occur within minutes in a sensitized individual and can be fatal. Here, we report a case of allergic reaction encountered during induction of anesthesia, after administration of intravenous infusion using lactated Ringer solution.

Keywords: allergy, Ringer lactate, anesthesia

INTRODUCTION

Allergic reactions may be noted by an anesthesiologist during various stages of anaesthesia that include induction, maintenance, and post anesthesia care. The incidence of allergic reactions is most common in the perioperative period as a result of various drugs being used concomitantly.[1,2] It is of paramount importance that an allergic reaction be rapidly diagnosed and adequately treated, because anaphylaxis and acute allergic reactions can occur within minutes in a sensitized individual and can be fatal.[3] Here, we report a case of allergic reaction encountered during induction of anaesthesia, after administration of intravenous infusion using lactated Ringer solution. Ringer lactate is one of the most commonly used and one of the first line intravenous fluids used. This case report highlights the allergic reaction noted by us in a parturient posted for an emergency cesarean section.

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CASE REPORT

A 26-year-old (weight 60 kg, height 166 cm) MPC II, ASA I_E primigravida was posted for an emergency Cesarean section in view of twin gestation with fetal distress. The patient was oriented and cooperative during physical examination. Her vital signs were as follows: blood pressure 130/76 mm Hg, pulse rate 90 per minute, and respiratory rate 16 per minute. The patient was given aspiration prophylaxis in the form of ranitidine and metoclopromide injections intravenously before being shifted to the operating room. No other preanesthetic premedications were given.

The patient was received in the operation theater (OT), with a large bore intravenous cannula in situ; routine monitors were attached, and a blood pressure of 124/76 mm Hg and a heart rate of 78 per minute were recorded. The patient was planned for single shot spinal anaesthesia and was being preloaded with 500 mL of intravenous Ringer lactate solution.

About 5 minutes later after starting intravenous Ringer lactate solution, the patient developed wheals and rashes with itching over the right upper limb, which seemed to be an allergic manifestation of an unknown etiology at this stage. No other drugs were administered, neither was any pharmaceutical intervention done inside the OT, nor in the labor room,

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except for injecting ranitidine and perinorm, which the patient had received earlier without any allergic manifestation. During this time, there was no evidence of any cardiorespiratory compromise. Vital signs were stable with blood pressure of 116/78 mm Hg and heart rate of 74 per minute. Hydrocortisone (200 mg) and chlorpheniramine maleate (22.7 mg) injections were given, and the Ringer lactate infusion was stopped immediately. The symptoms subsided completely in 3–4 minutes; however, it took about 2 hours for the wheals and rashes to disappear completely.

The patient did not have any history of allergy (allergy to latex was also ruled out) and atopy, nor did she have any history of previous hospital admission or surgery performed, except for minor ailments. Allergic manifestations, as observed in this patient, were in the form of wheals and rashes over the volar aspect of the forearm in which the intravenous drip was given. Other causes of the allergic manifestations were ruled out. Even the crystalloid administered was not cold enough so as to result in any of such manifestations. The surgery was performed, as planned, without any other untoward events. Intraoperatively, one unit of normal saline and one unit of gelofusine were administered after changing the intravenous cannula. Inserting a new intravenous line also helped us to rule out any reaction to the intravenous line, and the surgery was performed, as planned, without any untoward incident.

At this point of time, it was thought that these complaints were because of lactated Ringer solution. So, to confirm the diagnosis, a valid informed consent was taken and intravenous infusion of lactated Ringer solution was started in the post anesthesia care unit with all emergency drugs and equipment kept ready. The patient had a similar reaction again this time, although the magnitude of the reaction was less. Our patient was not willing to undergo any further detailed evaluation including Intradermal test or more specific laboratory findings. Hence, the patient was later discharged with specific instructions to inform other health care providers in case of readmission because of some other ailment.

DISCUSSION

The Ringer saline solution was invented in the late 1800 by Sydney Ringer,[4] a British physiologist, which was further modified by Alexis Hartmann for the purpose of treating acidosis in children. Hartmann modified the solution by adding lactate, which mitigates changes in pH by acting as a buffer for acid. Thus, the solution became known as the 'Lactated Ringer Solution' and later, as the 'Hartmann solution.'[5] The lactated Ringer solution is isotonic with blood and intended for intravenous administration. It is a sterile, nonpyrogenic solution for fluid and electrolyte replenishment and caloric supply in a single dose container for intravenous administration. Each 100 mL contains 600 mg of sodium chloride, 310 mg of sodium lactate, 30 mg of potassium chloride, and 20 mg of calcium chloride. It contains no antimicrobial agents.[6]

A common side effect of the lactated Ringer solution is irritation on the side of administration. It has traditionally been colloids, which were always said to be associated with allergic reactions, although uncommon allergic and anaphylactoid reactions such as localized or generalized urticaria and pruritus, periorbital, facial, and/or laryngeal edema; coughing; and/or difficulty in breathing have been reported with the lactated Ringer solution.[6] Hereby, we are reporting one case, where we encountered allergic manifestations after the start of intravenous infusion with the Ringer lactate solution. Our patient also developed wheals and rashes with itching shortly after initiating the infusion of the lactated Ringer solution. Although our patient did not have any history of food or drug allergy, this has been seen more commonly in patients with allergy to corn or corn products, thus, use of the Ringer lactate solution is contraindicated in the same.[7] It has also been documented that the frequency of the signsof the Ringer lactate solution allergy is higher in women during pregnancy,[6] and this may be attributed to immunological changes associated with pregnancy.

The exact mechanism of allergy to lactated Ringer solution is not known. It is still questionable as to which component of lactated Ringer solution is responsible for this manifestation. It has been suggested that there is a chemical called di-2-ethylhexylphthalate (DEHP) used as plasticizer in plastic containers, which can lead to an allergic reaction in some patients. The VIAFLEX plastic container is fabricated from a specially formulated polyvinyl chloride, which contains DEHP. The amount of water that can permeate from inside the container into the overwrap is insufficient to affect the solution significantly. However, the solution can leach out a small amount of chemical component from the container, up to 5 ppm.[8] Takano et al studied the effect of DEHP on atopic dermatitis like skin lesions in mice. He found that lower doses of DEHP caused larger effects than higher doses did. Specifically, while DHEP doses from 0.8 to 20 μg increased immune reactions compared to controls, the higher doses of 100 μg had no such effects.[9] This can be a possible reason for the cause of allergy in our patient who had received only about 50 mL of the lactated Ringer solution, which contains a very low dose of DEHP.

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Various tests to evaluate drug allergy are the intradermal test, test of measurement of serum antibody levels, and the test to challenge administration of the offending drug–challenge test. However, the challenge test is inherently dangerous and hence should be avoided. However, our patient was not willing to undergo any other test apart from repeat administration of the Ringer lactate solution in controlled condition. Skin test, whether the intradermal test or the prick test, is the most useful method of determining drug allergy but has low sensitivity in case of colloid infusions or contrast media.[10–12] No study has been found to suggest the immunologic mechanism of allergy to lactated Ringer solution. This case report is not without its flaws, but the basic aim is to attract the attention of the clinician to the fact that such an entity may exist, and it is equally important to be equally vigilant even when crystalloids are being administered.

There were no cases of allergic reaction to the Ringer lactate solution as such, however, there were case reports implicating 5% maltose and the Ringer lactate with 5% maltose in anaphylactoid reaction.[13] Litvin et al[14] and Didem et al[3] reported a case of anaphylactic reaction to an isotonic solution of 0.9% normal saline.

In conclusion, the physician has to be aware that even crystalloids used in clinical practices have the potential for such a manifestation. Henceforth, it is imperative at this stage that clinicians be on their toes and not neglect any reactions observed as this can prevent any future catastrophe.

Our aim of presenting this case report is to attract attention of physicians toward unusual allergic reactions with the lactated Ringer solution which is the most commonly used intravenous fluid during clinical practices and even during surgical procedures.

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