

Acute Localized Bullous Lesions Caused by Extravasation of Total Parenteral Nutrition

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Abstract

Acute localized bullous lesions (ALBL) characterized by fluid-filled blisters due to extravasation injury associated with hyperosmolar total parenteral nutrition (TPN) is a painful event especially for neonates and elderly patients. Here, the case of hyperosmolar TPN-induced ALBL was progressed through an extravasation injury while administrating through peripheral venous access catheter. Immediate discontinuation of the TPN administration and proper localized supportive cares helped the bullous lesions to heal within a week. Peripheral administration of hyperosmolar TPN increases the risk of extravasation injury which may lead to acute bullous lesions, and immediate care and withdrawn of the TPN solution may be effective to recover the associated harm shortly.

Keywords: *Acute Localized Bullous Lesions (ALBL); Total Parenteral Nutrition (TPN); Extravasation Injury (EI)*

Introduction

Acute localized bullous lesion (ALBL) is a generalized skin eruption characterized by fluid-filled blisters also called, bullae [1]. The leakage of intravenous fluid from blood vessel (where cannula enters into the vein) into surrounding tissue spaces during its administration cause localized extravasation injury (EI) [2] and extravasation-induced ABL is a secondary injury which may lead to deep tissue damage and require long-term care [1]. Total parenteral nutrition (TPN) is a gastrointestinal tract-bypassing system that provides nutritional support to critically ill patients. Hyperosmolar intravenous TPN-associated extravasation injury leading to ABL is a serious consequence of TPN-induced injury [3]. This case presents multiple acute bullous lesions (Figure 1A) due to extravasation of TPN.

Case Report

A 61-year-old man with metastatic colorectal cancer admitted in hospital with a 2-day history of post-chemo-induced generalized weakness, shortness of breath and vomiting. He was on morphine (oral titrated dose) for his cancer pain and morphine was continued during hospital admission. Enteral feeding was stopped until his third day of hospitalization, and to restore his daily nutrition with partial calorie need, peripheral TPN (Kabiven Perifer, Fresenius Kabi India Pvt. Ltd.) was prescribed to administer through his peripheral venous access device (cannula) at a rate of 60 mL/h. The TPN solution (approximately 650 mOsmol/L) with relatively low osmolarity contained 11% glucose, 20% lipid emulsion and 2.36% amino acid with a calorie value of 1000 KCal. About 4 h after initiating the TPN infusion, he developed extravasation (Figure 1A) with TPN fluid around the venous access catheter in his left forearm. The TPN infusion was stopped immediately, and after 3h, he developed multiple fluid-filled discrete, well-demarcated, circular blisters surrounding the extravasation-site (Figure 1A). No other drug was administered within 4h before or at the time of TPN administration. No skin eruption sign was found in any other organ. He had no previous history of drug allergy. At first, the peripheral venous catheter was removed and a central venous catheter was inserted through his right femoral vein. The skin lesions were treated with topical steroid-antibacterial preparation and antibacterial gauze dressing for 1 week (Figure 1B).



Figure 1: A: Total parenteral nutrition-induced fluid-filled multiple blisters in the left forearm.
B: Healed blister areas in the forearm after one week of treatment with local therapies.

Discussion

TPN is a hyperosmolar, ionic, acidic solution containing carbohydrate, fat emulsions, nitrogen, multiple electrolytes, trace elements and vitamins [3]. Intravenous infusion cause extravasation-induced soft tissue injury due to the osmolarity of the extravasate, cytotoxic property of the extravasate, flow of infusion and the vasoconstrictive property of the extravasate [4]. The concentrations of chemical constituents, hyperosmolarity, pH (6.5) and ionic properties of the TPN solution make it toxic to the surrounding tissues when extravasated, and acutely form localized bullae [3,4]. Extravasation due to TPN is common in case of peripheral catheter device than central catheter device [5]. The process of occurring extravasation is significantly enhanced when pressurized infusion pump is intended to administer a hyperosmolar TPN infusion through peripheral venous cannula [6]. Improper cannulation technique is the major cause of mechanical extravasation injury, whereas pharmacologic extravasation injury is due to the chemical property of certain drugs, and this toxic phenomenon is highly patient-specific [4,7]. Blister formation following extravasation is a complex phenomenon, mostly depends on the physiochemical properties of the vesicants, and in serious skin eruptions like ALBL, vesicant binds with the healthy cell-DNA resulting in cell necrosis [2]. In this case, the peripheral hyperosmolar TPN solution was assessed as the prime cause of extravasation injury leading to ALBL.

Extravasation associated with intravenous infusion is not uncommon worldwide [4] and a study in a UK hospital reported that 39% of adult patients developed extravasation over a period of five-week [8]. Peripheral hyperosmolar TPN solution-mediated extravasation injury resulting in skin eruptions has been reported worldwide [5,6] and here, blisters due to extravasation injury developed within a few hours with hyperosmolar TPN solution.

Conclusion

This case shows that localized acute fluid-filled blisters may be developed due to low osmolarity total parenteral nutrition solution when the patient is hypersensitive to one or more of its components. We suggest close observation of the intravenous site along with the insertion of long lines or central catheters in these patients to avoid this complication.

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