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Case Report Open Access

A Fat Overload after Fat Emulsion High Dose Infusion in an Infant

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Abstract

Intravenous fat emulsion (IVFE) is an integral part of the Parenteral Nutrition (PN), in infancy there is a limited data regarding acute toxicity and management regarding fat emulsion overdose. We are reporting an infant who received an accidental high dose of fat emulsion and was successfully treated with a single – volume exchange. In infant with fat emulsion overdose, rapid assessment and treatment should be undertaken immediately to prevent life-threatening complication.

Keywords: Fat overdose; Infant; Plasma exchange

Abbreviations:

IVFE: Intravenous Fat Emulsion; PN: Parenteral Nutrition; EN: Enteral Nutrition

Introduction

Lipid emulsion are an important component of PN, both as a source of energy and a supplier of essential fatty acid [1] it has been used for nutrition support for more than 50 years. It is indicated when EN is unable to be initiated or tolerated, particularly in the setting of nonfunctional gastrointestinal tract.

Lipid emulsion is classified as a high – alert medication [2] due to the risk of electrolytes and mineral compounding errors during its production and metabolic derangements that may rise as a result of its use [3,4].

We report fat overdose in a 3-month old boy ex- premature that occurred as a result of accidental overdose of 20% intralipid who was successfully treated by plasma exchange.

Case Report

A male infant was born at 32 weeks gestation by caesarean section due to preterm labour pain with birth weight of 1.4 Kg, the baby was transferred to our hospital at the age of 4 days with free gas in the abdomen, he was operated on the same day and found to have perforated terminal ilium and peritonitis, no resection needed and placement of ileostomy was done. He was discharged home at 30 days of life with discharge weight of 2.1 Kg.

At 3 months of life he was admitted for ileostomy closure, one week later he was readmitted with abdominal distention and found to have intestinal obstruction, surgery was done and 15 cm of small bowel was resected, he was started on PN, nine hours after starting the intralipid he started to vomit and became tachypnoic with signs of respiratory distress, hyperthermia and extremely pale. His physical examination revealed tachypnea (60 breaths per minutes) respiratory distress with perioral cyanosis, tachycardia (160 beats per minutes), elevated blood pressure (100/40 mm HG) and a body temperature of 38.6 rectally.

Blood samples were taken and they were lipidemic so the rate of the intralipid infusion was checked and found to be 24 cc/hour instead of 2.4 cc/hour most likely related to the nurse not recognizing the decimal point on the device's display panel so it was immediately stopped and single volume exchange was performed through the central venous, plasma exchange was performed using Blood Cell Separator and fresh plasma where used.

Our patient condition improved dramatically in the following few hours, Brain MRI was performed two days later and it was normal. The patient was discharged home two weeks later with full recovery.

	Normal Range for Age (mmol/L	4 hours after Plasma Exchange	24 hours after Plasma Exchange
HDL	0.9 - 1.45	1.5	0.7
LDL	0 - 4.4	3	1.16
Cholestrol	3.4 - 5.7	4.2	3.7
Triglyssarid	0 - 2.3	2.4	2.1

Table 1: Dramatically improved values in few hours.

Discussion

IVFE are complex pharmaceutical products the clinical events and adverse effects are related to their composition (fat source, emulsifier) characteristics (oil in water emulsion) stability and sterility [5-8]. IVFEs are integral part of the PN regimen in neonate [9], it provide a concentrated isotonic source of calories and prevent or reverse essential fatty acid deficiency.

Continuous fat infusion over 24 hours [10,11] is the preferred method in neonate, the administration rate of 0.15 g/kg/hour for IVFE in the neonate should not be exceeded [12].

Essential fatty acid can be prevented in neonates by providing IVFE in a dose of 0.5-1 g/kg/day [13], serum triglyceride levels should be maintained at <150-200 mg/dl.

The incidence of complications associated with the use of IV fat is low, if the IV fate infusion exceeds its maximal clearance rate, hyperlipidaemia occurs which can cause impairment of pulmonary function and fat overload syndrome (hypertriglyceridemia, fever, lethargy, liver damage, and coagulopathy) [14]. Mckeen et al. [15] found that that administrating IV fat doses of 0.25 g/kg/hour to sheep caused an increase in pulmonary artery pressure, a decrease in arterial PaO_2 and an increase in pulmonary lymphatic flow. Deterioration of pulmonary function may be partially due to increase pulmonary vascular constriction [16], complication of intralipid include vasoconstriction leading to hypertension [17,18] and gas exchange problem [19].

The side effect of emulsion is related to the dose and the rate of administration [20], the acute effect of hypertriglyceridemia include elevated liver enzymes, hemolysis, respiratory distress and possibly impaired cell mediated immunity. High doses of lipid in the serum can result in a picture similar to hyper viscosity syndrome or fat overload syndrome [21].

The neonatal population may have the highest risk of medication error [22] in apart because of the neonates immature physiologic development [23] and according to MEDMARX, a national, internet-accessible medication error reporting program owned and operated by the United State Pharmacopeia many of these errors were the result of the nurses misinterpretation of the modes (i.e., time, volume or rate) on the infusion device or by not recognizing the decimal point on the device's display panel [24].

Single plasma exchange used in adult for the treatment of accidental bolus of PN but there is a limited literature regarding its use in infants.

Conclusion

In conclusion, in a patient receiving PN with the development of rapid deterioration of the clinical condition, PN overdose should be considered. In our case report single volume plasma exchange showed to be effective in the treatment of fat overload. Moreover, the infusion rate and the dose should be double-checked by care givers who are responsible for PN.

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