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Case Studies

Extreme hypertriglyceridemia managed with insulin

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Abstract: Extreme hypertriglyceridemia can lead to acute pancreatitis and rapid lowering of serum triglycerides (TG) is necessary for preventing such life-threatening complications. However, there is no established consensus on the acute management of extreme hypertriglyceridemia. We retrospectively reviewed 10 cases of extreme hypertriglyceridemia with mean serum TG on presentation of 101.5 ± 23.4 mmol/L (8982 ± 2070 mg/dL) managed with insulin. Serum TG decreased by 87 ± 4% in 24 hours in those patients managed with intravenous insulin and fasting and 40 ± 8.4% in those managed with intravenous insulin alone ($P = .0003$). The clinical course was uncomplicated in all except 1 patient who subsequently developed a pancreatic pseudocyst. Thus, combination of intravenous insulin with fasting appears to be an effective, simple, and safe treatment strategy in immediate management of extreme hypertriglyceridemia.

Extreme hypertriglyceridemia (HTG) is associated with risk of acute pancreatitis[1] and should be treated promptly. The incidence of HTG-induced pancreatitis (HTGP) accounts for approximately 4% to 10% of all acute pancreatitis cases.[1,2] It is generally believed that triglyceride (TG) level of >11.3 mmol/L (1000 mg/dL) triggers acute pancreatitis.[1] This threshold, however, is arbitrary and a few studies suggested a higher TG level at presentation of around 40 to 50 mmol/L.[2,3]

Both primary (genetic) and secondary disorders of lipoprotein metabolism such as diabetes mellitus, obesity, hypothyroidism, excessive alcohol consumption, and medications can lead to severe HTG.[1,2,4]

A variety of treatment modalities including insulin, heparin, and plasmapheresis have been described in the literature for rapid lowering of serum triglyceride level.[1] However, the efficacy and safety of individual modalities have not been well established and there is no consensus on the management of extreme HTG (serum TG level ≥50 mmol/L) (≥4428 mg/dL) in the acute setting. Thus, cases with extremely high TG levels present a management

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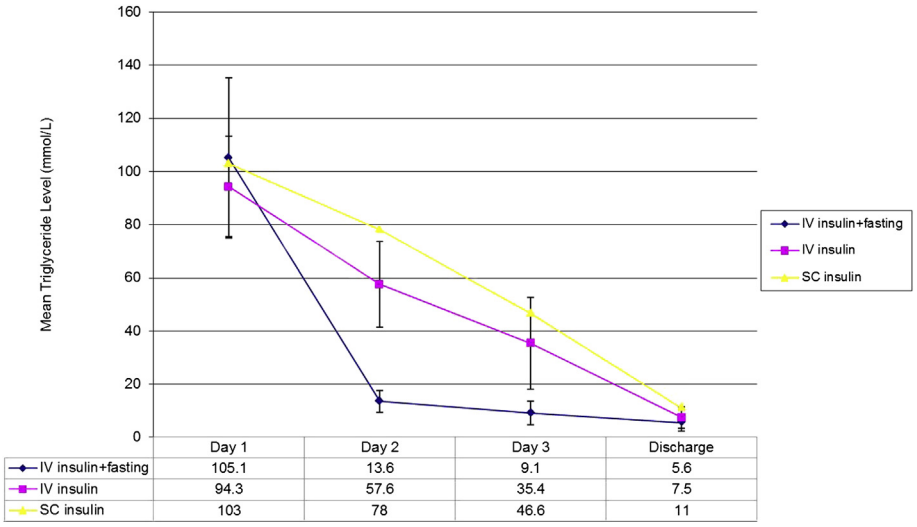

	Day 1	Day 2	Day 3	Discharge
IV insulin+fasting	105.1	13.6	9.1	5.6
IV insulin	94.3	57.6	35.4	7.5
SC insulin	103	78	46.6	11

Figure 1 Trends of mean triglyceride levels (mean reduction of 87% in the first 24 hours in the IV insulin + fasting group vs 40% in the IV insulin alone group; $P = .0003$). Error bars represent standard deviations. IV, intravenous.

challenge and the objective of this study is to review acute management and clinical course of patients with extreme hypertriglyceridemia.

Methods

We retrospectively reviewed cases of extreme HTG (serum TG level ≥50 mmol/L) (≥4428 mg/dL) presented to our institution between January 2010 and December 2013. Cases were identified from a list of inpatients for which an endocrinology consult was sought. A detailed medical records review was conducted to identify baseline epidemiological and clinical characteristics of these patients and the type and effectiveness of treatment modalities used in acute management of extreme HTG. Ethics approval was obtained from the Institutional Human Research Ethics Committee. Contiguous quantitative data were expressed as mean ± standard deviation and were compared using 2-tailed Student's t-test. Correlation was assessed by Pearson correlation coefficient. $P < .05$ was considered statistically significant.

Results

Ten patients presented with extreme HTG (serum TG level ≥50 mmol/L) between January 2010 and December 2013. Half of them (5) presented with pancreatitis. Mean serum TG level on presentation was 101.5 ± 23.4 mmol/L (112.9 ± 19.6 mmol/L in patients with pancreatitis and 90.2 ± 21.6 mmol/L in patients without pancreatitis; $P = .09$). The median age of the cohort was 39 years (range 24 to 55) and 9 of 10 patients were men. The group was multiethic with majority being Caucasians (6 of 10 cases), 1 Torres Strait Islander, 1 of Maori origin, and 2 Indians. Mean body mass index was 31.8 ± 6.5 kg/m^2. Nine of 10 cases were patients with type 2 diabetes, 3 of which were newly diagnosed with diabetes on presentation. Four of the 6 patients with known diabetes were taking insulin before the presentation. Mean HbA1C was 109 ± 31 mmol/mol (12.2 ± 2.8%) and mean blood glucose level on presentation was 17.4 ± 7 mmol/L without evidence of diabetic ketoacidosis or hyperosmolar state. One patient without diabetes was thought to have L-asparaginase–induced HTG. None of the patients had excessive alcohol intake. Family history of dyslipidemia was reported only by 1 patient. Lipoprotein electrophoresis and Apo lipoprotein E (ApoE) genotype results were available for 5 patients. Three patients had Frederickson's type V and 2 had type III lipoproteinemia. Four patients were homozygous for ApoE3 and 1 was heterozygous for ApoE3/4. All patients had normal thyroid and renal functions.

Nine patients were managed with intravenous (IV) insulin infusion (5 were also kept fasting, 4 had pancreatitis) and 1 patient (patient 1) was managed with subcutaneous basal prandial insulin regimen. Five patients received subcutaneous low-dose unfractionated heparin 5000 units twice daily or low-molecular-weight heparin (enoxaparin 40 mg once daily) as prophylaxis for deep vein thrombosis. Concurrent lipid-lowering agents (Supplementary Table 1) included statin (n = 5), fibrate (n = 10), omega-3 fish oil (n = 4), ezetimibe (n = 2), and niacin (n = 1). Five were on a statin, 2 were on a fibrate, and 1 was on ezetimibe before their presentation. All patients received dietary education and low-fat diet was recommended to patients who were not fasted.

Mean serum TG levels decreased by 87 ± 4% in the first 24 hours (from 105.1 ± 30.1 mmol/L to 13.6 ± 4.1 mmol/L) in those patients who were managed with IV insulin and fasting (patients 3, 4, 5, 9, and 10), 40 ± 8.4% in the first 24 hours (from 94.3 ± 18.9 mmol/L to 57.6 ± 16.2 mmol/L) in those managed with IV insulin alone (patients 2, 6, 7, and 8) ($P = .0003$) and by 23.5% (from 102 to 78 mmol/L) in the patient managed with subcutaneous insulin (patient 1).