

Case Report: Severe hypertriglyceridemia in a nondiabetic treated with low dose insulin infusion

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SUMMARY

We report a case of a 54-year-old man with severe HTG which did not respond to conventional anti lipid therapies. He was treated with intravenous insulin and concurrent dextrose infusions which led to a dramatic reduction in serum triglyceride levels.

KEY WORDS:

Hypertriglyceridemia; insulin; non-diabetic; coronary artery disease

CASE REPORT

Severe hypertriglyceridemia (HTG), defined as serum triglyceride (TG) of ≥ 1000 mg/dl (11.2 mmol/l) is hazardous and associated with increased risk of atherosclerosis and acute pancreatitis. We report a case of a 54-year-old man with severe HTG which did not respond to conventional anti lipid therapies. He was treated with intravenous insulin and concurrent dextrose infusions which led to a dramatic reduction in serum triglyceride levels.

Our patient is a 54-year old Indian man who was referred to the Endocrinology Unit, Penang Hospital in March 2009 for HTG. He remained asymptomatic till November 2009 when he complained of pricking chest pain. Coronary angiogram showed complete total occlusion of his right coronary artery. He is not known to be diabetic and does not smoke. There is however a strong family history of coronary artery disease (CAD). Two of his siblings also have HTG. The patient is a school teacher who leads a healthy lifestyle and jogs daily. Clinically, the patient is lean with Body Mass Index (BMI) of 22 kg/m². He remained normotensive during follow-up and did not have any clinical stigmata of hyperlipidaemia. Despite being on combinations of statin, fenofibrate and fish oil, his TG levels remained elevated. (Table I). He did not have any secondary causes for his elevated TG. After discussion, the patient agreed to be admitted electively for intravenous insulin infusion. In the ward, he was given low fat/carbohydrate diet. Insulin infusion was initiated along with dextrose solution to maintain capillary blood sugar (CBS) above 4 mmol/L and thus prevent hypoglycaemia. As he was a non-diabetic, dextrose 20% was eventually given in an attempt to give a higher dose of insulin. The insulin infusion was based on a pre-determined fixed rate insulin infusion regime. CBS was monitored hourly whilst potassium levels rechecked 8 hourly. Daily serum TG was also

monitored. There was a dramatic reduction in serum TG level from 23.2 mmol/L prior to initiation of insulin infusion to 4 mmol/L on day 3 despite the fact that patient was receiving an average of 0.44 unit insulin per hour only (total 21 units over 48 hours). He did not experience any hypoglycaemia during his stay in the hospital. Three months after the insulin infusion his TG level was noted to be 7.2 mmol/l.

DISCUSSION

Fasting TG of ≥ 1.7 mmol/L is classified as elevated mainly based on prospective observational studies.¹ Current evidence suggests that fasting HTG is associated with increased risk of multiple complications such as cardiovascular events and acute pancreatitis.² Elevated TG is the third commonest cause of acute pancreatitis after gallstones and alcohol. A serum TG of 1000 mg/dl (11.2 mmol/l) or more increases the risk of acute pancreatitis which is postulated to occur because of breakdown of TG by pancreatic lipase. Hydrolysis of TG in and around the pancreas promotes accumulation of free fatty acid in the pancreatic capillary beds, causing capillary plugging. This will lead to ischemia, inflammation and acidosis.³ Measures to lower TG are therefore potentially life-saving in a patient like ours.

Insulin is a potent TG lowering agent which acts by enhancing lipoprotein lipase activity, an enzyme that accelerates chylomicron and Very Low Density Lipoprotein (VLDL) metabolism to glycerol and fatty free acids.³ Insulin also inhibits hormone sensitive lipase in adipocytes which is the key enzyme in breaking down adipocyte TG and releasing free fatty acid into the circulation. A few case series have demonstrated successful management with insulin monotherapy in the setting of HTG induced acute pancreatitis.⁴ Insulin therapy has been found to be safe and efficacious, even in patients without diabetes mellitus. While even a single dose of subcutaneous insulin (at 0.1 unit/kg) showed immediate reduction of TG, intermittent subcutaneous insulin failed to maintain TG level below 1000mg/dl (11.2 mmol/L) in contrast to gemfibrozil or fish oil.⁴ Intravenous insulin seemed to be more effective in reducing TG levels, even after one month of therapy.³ The dose of insulin infusion used in these case reports was 0.1-0.3 units per kilogram per hour with dextrose infusions to prevent hypoglycaemia.⁵ In our patient the average insulin dose was only 0.44 units/hour and yet after three months of therapy his triglyceride level was 7.2 mmol/l. Therefore,

This article was accepted: 17 June 2015

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Table I: Cholesterol and triglyceride levels before and during insulin infusion

Cholesterol and Triglyceride levels during follow-up				
	20/10/09	26/10/10	7/6/11	18/9/12
Total cholesterol (mmol/l)	6.3	5.4	7.4	8
Triglycerides (mmol/l)	24.4	15.1	30.7	26.1
Cholesterol and Triglyceride levels during insulin infusion				
	25/3/13 Day 1	26/3/13 Day 2	27/3/13 Day 3	18/6/13 3 Months
Total cholesterol (mmol/l)	4.9	4.2	3.5	3.4
Triglycerides (mmol/l)	23.2	11.8	4.0	7.2

intravenous insulin infusion is an effective therapy option to reduce TG levels even with low doses particularly in cases of Familial Hypertriglyceridemia (FHTG) which our patient most likely has.

REFERENCES

1. Berglund L, Brunzell JD, Goldberg AC, *et al.* Evaluation and treatment of hypertriglyceridemia: An Endocrine Society Practice Guideline. *J Clin Endocrinol Metab.* 2012; 97(9): 2969-89.
2. Murad MH, Hazem A, Coto-Yglesias F, *et al.* The association of hypertriglyceridemia with cardiovascular events and pancreatitis: a systematic review and meta-analysis. *BMC Endocr Disord.* 2012; 12: 2.
3. Sujani P, Sumedha RP, Hemender SV, *et al.* Rapid Reduction of Severely Elevated Serum Triglycerides with Insulin Infusion, Gemfibrozil and Niacin. *Clin Med Res.* 2011; 9(1): 38-41.
4. Jabbar MA, Zuhri-Yafi MI, Larrea J. Insulin therapy for a non-diabetic patient with severe hypertriglyceridemia. *J Am Coll Nutr* 1998; 17(5): 458-61.
5. Srinivasa PM, Alan R. Hypertriglyceridemia, LPL deficiency and pancreatitis –pathogenesis and therapeutic options. *Br J Diabetes Vasc Dis* 2011; 11(3): 107-12.