

# Management of hypertriglyceridemia in uncontrolled type 2 diabetes mellitus patients: 2 case studies

## Introduction

Hypertriglyceridemia (HTG) is diagnosed when the serum triglyceride (TG) level exceeds 150mg/dL. The Adult Treatment Panel III of the National Cholesterol Education Program has suggested four TG strata: normal <150mg/dL, borderline high 150-199mg/dL, high 200-249mg/dL, and very high >500mg/dL.<sup>1</sup> HTG can be inherited as a primary familial trait in combination with dyslipidemia or can occur secondary to uncontrolled diabetes mellitus, obesity, alcohol consumption or estrogen therapy.<sup>2</sup> HTG is an important independent risk factor for cardiovascular disease and it is also associated with 1% to 7% of all cases of acute pancreatitis.<sup>3</sup> TG levels greater than 1000 mg/dL require urgent treatment to reduce the risk of pancreatitis.<sup>4,5</sup> The standard treatment of HTG with omega 3 fatty acids and fibrates, along with dietary changes, has no effect on an emergency situation. Type 2 diabetes mellitus is also a known cause of HTG. In type 2 diabetes mellitus patients, the major cause of morbidity and mortality is cardiovascular disease regarding the lipid profile. Abnormalities in triglyceride rich lipoprotein (TRL) metabolism are cardinal features of type 2 diabetes. Metabolic dysregulation resulting in HTG include enhanced hepatic secretion of TRL due to insulin resistance and delayed clearance of TRL involving lipoprotein lipase (LPL)-mediated lipolysis.<sup>6</sup> When patients have diabetes mellitus and HTG both, cardiovascular risk and other complications as acute pancreatitis, peripheral venous thrombosis, pulmonary edema and rhabdomyolysis increase markedly. We aimed to present two uncontrolled type 2 diabetes mellitus patients with severe HTG (TG level >1000mg /dL) who were treated successfully with insulin infusion.

## Case 1

A thirty-two-year-old woman previously healthy, was admitted to our outpatient clinic because of abdominal pain, polydipsia and edema in her body. On physical examination, she presented with blood pressure (BP) 120/72mmHg, heart rate (HR) 84bpm, respiratory rate (RR) 20rpm, temperature 36,5°C, O<sub>2</sub> saturation 98. Examinations of respiratory, cardiovascular, abdominal systems and extremities were all normal. She had no history of alcohol consumption. She had no diabetic retinopathy in her eye examination. Laboratory tests show; glucose 351mg/dL, TG 1316mg/dL, HbA1c 14.7%, ketonuria and glycosuria. We checked amylase and lipase tests which resulted as 27U/L-26U/L to exclude acute pancreatitis. Abdominal ultrasound showed just signs of fatty liver and hepatomegaly (168mm). So the patient diagnosed with uncontrolled diabetes mellitus with severe HTG. Intravenous fluid therapy and 0.1U/kg insulin continuous perfusion initiated to control glucose and TG levels. TG level decreased progressively, and at 48hours TG level dropped to 199mg/dL, LDL 136mg/dL, total cholesterol 211mg/dL with this treatment. To exclude type 1 diabetes mellitus; insulin antibodies were negative, C-peptide 0.78nmol/L and no metabolic acidosis. Glycemia were well controlled with subcutaneous insulin regimen (insuline glargine and insulin glulisine), negative glycosuria and ketonuria. She had no HTG again on her follow-up monitoring without medication.

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## Case 2

A fifty-two-year-old woman was admitted to our outpatient clinic with fatigue, headache and back pain. She has type 2 diabetes mellitus, hyperlipidemia, hashimoto tiroiditis, asthma diagnosis and a history of acute pancreatitis 5years ago. She had acute pancreatitis, 3years after diagnosed with type 2 diabetes. She had no history of alcohol consumption. On physical examination she presented with blood pressure (BP) 118/74mmHg, heart rate (HR) 78bpm, respiratory rate (RR) 19rpm, temperature 36,8°C, O<sub>2</sub> Saturation 98. She had nonspecific left lower abdominal pain that intensifies with palpation and hepatomegaly of 3cm below costal margin. She had no diabetic retinopathy in her eye examination. Laboratory tests showed; glucose 393mg/dL, TG 9283mg/dL, total cholesterol 1089mg/dL, HbA1c 14%, venous gas sample pH 7.38, ketonuria and glycosuria. To exclude new pancreatitis attack; laboratory tests showed; amylase 40U/L, lipase 33U/L, abdominal ultrasound showed signs of fatty liver and abdominal MRI showed hepatomegaly (210mm). Fluid therapy and continuous insulin perfusion (0,1U/kg) initiated for hyperglycemia and HTG treatment. TG levels decreased progressively. At 5th day, TG levels dropped to 674mg/dL and total cholesterol to 834mg/dL. At 6th day TG was 380mg/dL. Glycemia were well controlled with subcutaneous insulin regimen (insuline glargine and insulin aspart), negative glycosuria and ketonuria. She treated with omega 3 fatty acids and fibrates on her follow-up monitoring and her TG levels were moderately high.

## Conclusion

Patients with untreated diabetes mellitus and insulin deficiency commonly have HTG; this condition occurs more frequently in type 2 than in type 1 diabetes mellitus. Appropriate diabetes management reduces TG levels.<sup>7</sup> Insulin promotes the synthesis of lipoprotein lipase, which hydrolyzes TG into fatty acids and glycerol and

facilitates storage of the fatty acids in adipocytes.<sup>8</sup> In a non-diabetic adolescent patient with severe HTG, a bolus dose of regular insulin (0.1U/kg) given subcutaneously decreased serum TG from 1893mg/dL to 1015mg/dL after only 4hours.<sup>9</sup> Treatment with insulin infusion is an effective and minimally-invasive form of rapidly treating severe HTG in addition to other pharmacological agents in both diabetes mellitus and isolated HTG patients. It is important to keep TG levels under 150mg/dL to reduce the risk of cardiovascular morbidity, acute pancreatitis and other complications.

## Acknowledgements

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## Conflict of interest

Author declares that there is no conflict of interest.

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