

Case Report

Hypertriglyceridemia induced Acute Pancreatitis and Efficacy of Therapeutic Plasma Exchange

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DOI: <https://doi.org/10.3329/bccj.v12i1.72403>

Abstract:

Acute pancreatitis is a condition in which the pancreas becomes inflamed suddenly within a short period of time. Typically, this condition lasts less than 6 weeks, with most cases resolving within 1-2 weeks. The major causes of acute pancreatitis are ethanol, gallstones, and hypertriglyceridemia. Acute pancreatitis that is caused by hypertriglyceridemia can be severe and life-threatening. Compared to other causes of pancreatitis, studies have shown that the acute pancreatitis induced by hypertriglyceridemia is more serious and can lead to recurrent episodes of pancreatitis, eventually leading to chronic pancreatitis. Here, we report a clinical experience with a patient of high triglyceride induced pancreatitis. He was treated with two sessions of Therapeutic Plasma exchange along with intravenous insulin, statins, and fibrates. In recent times, plasmapheresis has been used to treat severe cases of hypertriglyceridemia-induced acute pancreatitis with success. Early initiation, along with appropriate supportive measures, may lead to favourable outcomes and reduce the risk of complications. However, further research is needed to determine the exact role and timing of plasmapheresis in managing acute pancreatitis caused by hypertriglyceridemia.

Key words: Lipid Profile, Pancreatitis, Plasmapheresis, Triglyceride, Mortality.

Introduction:

Acute pancreatitis is a condition in which the pancreas becomes inflamed suddenly. The major causes of acute pancreatitis are ethanol, gallstones, and hypertriglyceridemia. Hypertriglyceridemia is the third leading cause of acute pancreatitis and can cause between 5-25% of cases.¹ The risk of developing acute pancreatitis due to hypertriglyceridemia increases as the levels of triglycerides in the body rise. Particularly, when triglyceride levels exceed 1,000-2,000mg/dl, the risk is significantly elevated.¹ Acute pancreatitis that is caused by hypertriglyceridemia can be severe and life-threatening. Compared to other causes of

pancreatitis, studies have shown that the acute pancreatitis induced by hypertriglyceridemia is more serious and can lead to recurrent episodes of pancreatitis, eventually leading to chronic pancreatitis. Chronic pancreatitis can cause exocrine pancreatic insufficiency, resulting in malabsorption and endocrine pancreatic failure, which can cause diabetes. Treatment for hypertriglyceridemia-induced acute pancreatitis is mainly supportive. The treatment includes fluid resuscitation, pain control, and antibiotics if necessary.² Plasmapheresis has shown to be beneficial in reducing the level of triglycerides, but there is not enough evidence to suggest it decreases mortality rates.³ However, in recent times, plasmapheresis has been used to treat severe cases of hypertriglyceridemia-induced acute pancreatitis with success.

Case Summary

A 30-year-old female morbidly obese patient was admitted to the ICU of a tertiary care hospital in Dhaka with several symptoms. She had been experiencing abdominal pain for three days, vomiting multiple times, and shortness of breath for a few hours. The patient had a known history of hypertension but denied any alcohol consumption, smoking, or drug abuse. She did not have hyperlipidaemia or type II diabetes mellitus. Upon arrival in the ICU, the patient was in severe abdominal pain and respiratory distress. The examination revealed tenderness in the epigastric area and sluggish bowel sounds. Her abdomen was distended, but she remained fully awake and alert. Vital signs showed a non-recordable blood pressure, a heart rate of 74 bpm, a respiratory rate of 23 bpm, oxygen saturation of 93% with 2 liters of oxygen. Initially after admission patient's blood sugar was very high (19mmol/l) and patient. Patient has some

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outside investigation reports which revealed elevated sepsis marker and UTI. Due to abdominal pain and presence of eruptive xanthoma (Picture 1).



Fig 1: Eruptive xanthoma on left hand

Serum lipase level was investigated with another routine test. Serum lipase level was very high, and USG confirmed swollen (inflamed) pancreas. As the patient had all the features of acute pancreatitis (epigastric tenderness, raised serum lipase and swollen pancreas), the patient was diagnosed as a case of acute pancreatitis provisionally. The patient was started on lactated Ringer's solution to provide fluid support and empirical antibiotic coverage to target any potential infection. Pain control measures were also implemented to alleviate the patient's discomfort. Given the severity of the patient's condition, the medical team decided to initiate plasmapheresis. This procedure involves the removal of plasma from the blood, which can help reduce the levels of triglycerides (TG) and other harmful substances.



Fig 2: Patient undergoing therapeutic plasma exchange

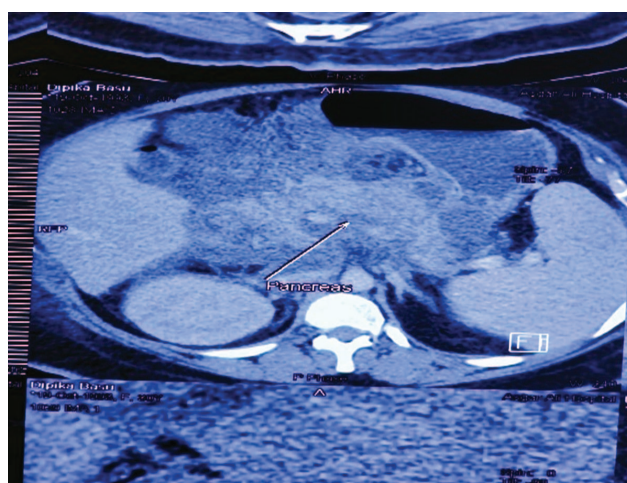


Fig 3 : Plasma Exchange Machine



Fig 4 : Following plasma Exchange

After the completion of one cycle of plasmapheresis, the patient's TG level decreased from 6500 mg/dl to 2314 mg/dl. Following second session dialysis, TG level further decreased to 958 mg/dl. Furthermore, the patient's renal function and serum calcium levels normalized within one day. The creatinine level decreased from 3.53 mg/dl to 0.83 mg/dl, while the serum calcium level adjusted for albumin improved to 4.06. The electrolyte imbalance also showed improvement, with sodium levels increasing to 139 mmol/L and potassium levels decreasing to 3.0 mmol/L. Liver function tests also demonstrated improvement, with AST levels decreasing to 176 U/L and ALT levels decreasing to 91 U/L. The patient's clinical condition improved significantly within hours of receiving plasmapheresis. The patient received total two session of plasmapheresis in two consecutive days. After 48 hours of patient's admission a CT Abdomen was done which revealed swollen necrotizing pancreatitis (fig 5). Following plasmapheresis, the severity of abdominal pain lessened but still it was non-tolerable. Due to severe abdominal pain Epidural analgesia given and thus patient's abdominal pain managed. Subsequently the patient was able to tolerate oral intake after finishing few days of conservative management.



Pic-5 : CT abdomen with contrast revealed swollen and necrotizing pancreas

Discussion

Severe hypertriglyceridemia, characterized by serum triglyceride concentrations exceeding 1000 mg/dl, is a known risk factor for acute pancreatitis (AP).² This condition can also interfere with laboratory tests, making it challenging to diagnose and manage patients. In some cases, the serum sample may be so lipemic due to high triglyceride levels that testing cannot be performed initially. Ultracentrifugation can be used to extract serum for diagnostic testing in these situations. The exact mechanisms underlying hypertriglyceridemia-induced AP are not fully understood. One proposed mechanism involves the hydrolysis of triglycerides by pancreatic lipase, which leads to the accumulation of high concentrations of free fatty acids and chylomicrons. This can cause injury to acinar cells and capillary plugging, resulting in ischemia and acidosis. These processes can activate trypsinogen and trigger acute

pancreatitis.⁴⁻⁵ Conventional management of hypertriglyceridemia involves dietary fat restriction and pharmacotherapy, which can be time-consuming. In patients with severe acute pancreatitis, urgent reduction of triglyceride levels is necessary to prevent complications. However, oral pharmacological therapy may not always be feasible in these cases.

Plasmapheresis is an effective therapeutic option for rapidly lowering triglyceride levels in patients with severe hypertriglyceridemia-induced AP. There have been several case studies published in the literature supporting its use.^{5,6} The indications for plasmapheresis or lipid apheresis in these cases include patients who are refractory to nutritional and pharmacological approaches, serum triglyceride levels exceeding 1000 mg/dl, serum lipase levels three times the upper limit of normal, severe hypocalcaemia, lactic acidosis, and worsening inflammation and organ dysfunction⁵.

The beneficial effects of plasmapheresis are attributed to the rapid decrease in triglyceride levels⁵. Additionally, the removal of excessive proteases from the plasma, which are key enzymes in inflammation, and the replacement of consumed protease inhibitors may provide additional benefits. While a recent review found that plasmapheresis reduced triglyceride levels by 46-80%, there was insufficient evidence to determine its impact on patient outcomes⁶. However, another observational study showed that plasmapheresis effectively reduced triglyceride levels faster than conservative treatment and improved outcomes.⁶ The timing of plasmapheresis initiation may be crucial, as early use has been associated with a reduction in morbidity and mortality.

In our cases, we initiated plasmapheresis within 48 hours of diagnosing hypertriglyceridemia-induced AP. Both patients experienced rapid reduction in triglyceride levels and improvement in organ failure.

Conclusion:

Plasmapheresis can be an effective treatment option for patients with severe hypertriglyceridemia-induced acute pancreatitis. Early initiation, along with appropriate supportive measures, may lead to favourable outcomes and reduce the risk of complications. However, further research is needed to determine the exact role and timing of plasmapheresis in managing acute pancreatitis caused by hypertriglyceridemia.

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