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CASE REPORT

Early-onset lipoprotein lipase deficiency: detailed analysis of severe hypertriglyceridemia and recurrent necrotizing pancreatitis

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ABSTRACT

Background: Lipoprotein lipase deficiency (LPLD) is an exceedingly rare autosomal recessive disorder characterized by severe hypertriglyceridemia and significant clinical complications, notably recurrent acute pancreatitis.

Case Presentation: We present the detailed case of a Saudi girl who initially exhibited severe hypertriglyceridemia at 3 months old and received a genetic diagnosis at 8 months, confirming homozygous LPL deficiency (variant c.765_766del). Despite rigorous dietary management and medium-chain triglyceride supplementation, she experienced multiple episodes of necrotizing pancreatitis.

Conclusion: This report underscores the essential role of early genetic confirmation, rigorous dietary management, multidisciplinary care, and explores emerging treatment strategies for LPLD.

Keywords: Lipoprotein lipase deficiency, hypertriglyceridemia, pancreatitis, MCT supplementation, autosomal recessive, case report.

Introduction

Lipoprotein lipase deficiency (LPLD) is a rare autosomal recessive metabolic disorder characterized by markedly impaired triglyceride hydrolysis, leading to severe hypertriglyceridemia. It has a reported global prevalence of approximately 1–-2 per million individuals, with fewer than 300 reported cases globally (1,2). Patients typically present with recurrent episodes of pancreatitis, hepatosplenomegaly, eruptive xanthomas, and lipemia retinalis (3). Early diagnosis through genetic testing is critical for initiating appropriate dietary and medical interventions to mitigate the severe complications associated with the disease (4,5).

Case Presentation

A Saudi girl presented at 3 months of age with persistent vomiting, hepatomegaly, and poor growth. Initial laboratory tests showed severe hypertriglyceridemia (>10 mmol/l), lipemic serum, and significantly reduced high-density lipoprotein (HDL) cholesterol. Genetic testing results received at 8 months of age confirmed the diagnosis of LPL deficiency, identifying a homozygous pathogenic mutation (c.765_766del, p.Gly256Thrfs*26) in the LPL gene. The OMIM number for LPL deficiency is OMIM: 238600, and the reference sequence used was RefSeq NM_000237.3.

Management consisted of strict dietary fat restriction complemented by a specialized nutritional formula containing medium-chain triglycerides (MCTs). However, maintaining optimal triglyceride levels remained challenging, leading to recurrent episodes of severe necrotizing pancreatitis at 11 months, 2 years, and 3 years old (Figure 1). Each pancreatitis episode required intensive medical management, including insulin

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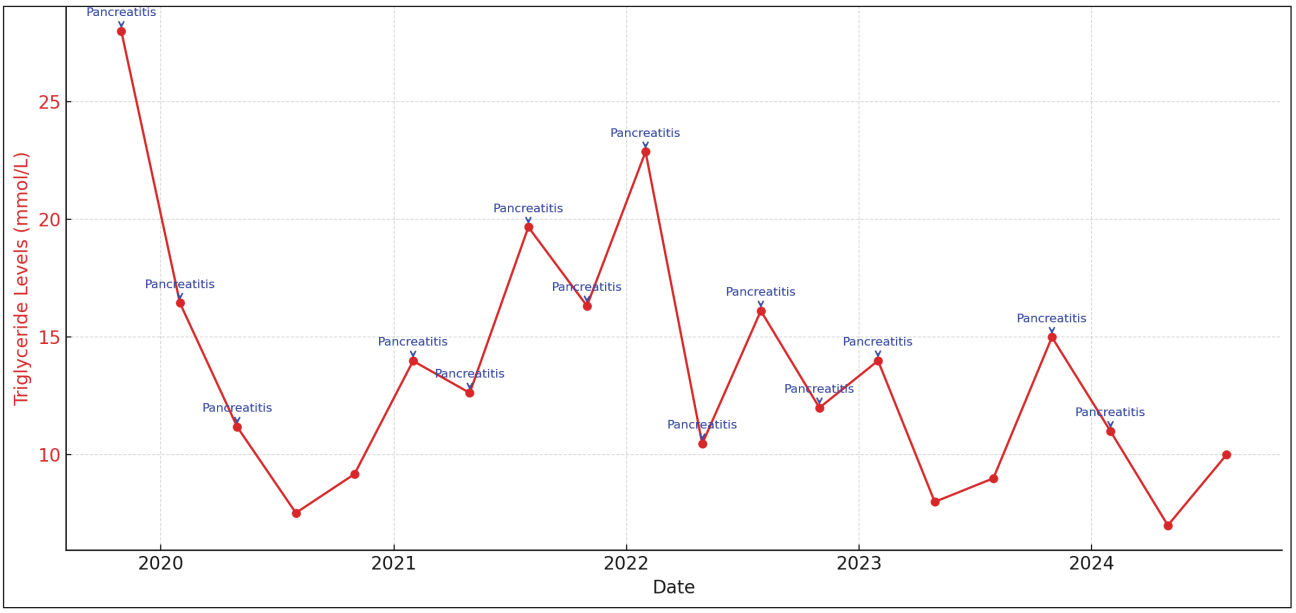

Figure 1. *Longitudinal triglyceride fluctuations correlated with episodes of recurrent pancreatitis. Elevated triglyceride levels are distinctly marked, reflecting episodes of pancreatitis, underscoring the relationship between triglyceride management and disease activity.*

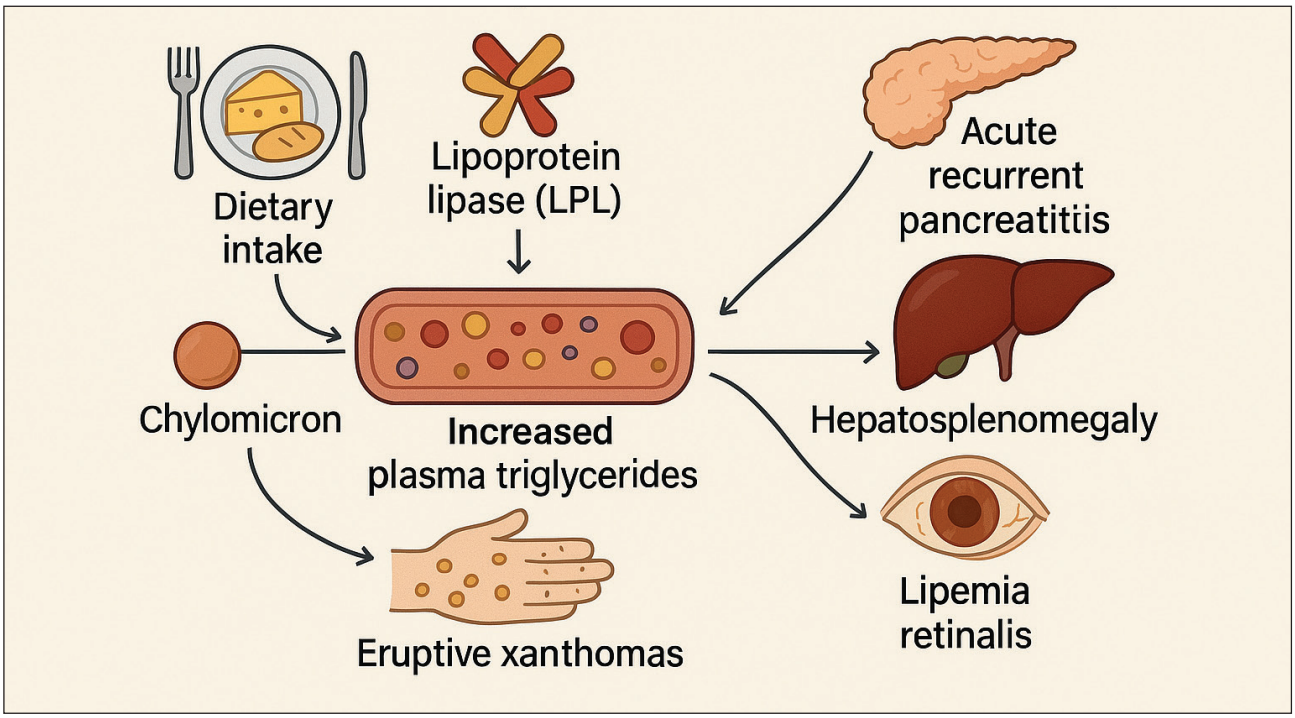

Figure 2. *Impaired metabolism of triglycerides in Lipoprotein Lipase (LPL) deficiency and associated clinical sequelae.*

infusion and intravenous heparin therapy, alongside stringent dietary modifications.

Discussion

LPL deficiency is a critically rare condition, with severe hypertriglyceridemia resulting from impaired clearance of triglyceride-rich lipoproteins due to deficient enzyme activity. A genetic mutation affecting the LPL gene impairs triglyceride hydrolysis, causing significant accumulation of chylomicrons and severe hypertriglyceridemia. The condition typically manifests clinically when triglyceride levels exceed 10 mmol/l, increasing the risk of acute pancreatitis (6-8).

The clinical hallmark of LPLD includes recurrent pancreatitis, eruptive xanthomas, hepatosplenomegaly, and lipemia retinalis (Figure 2). Recurrent pancreatitis remains the most critical complication due to its potential to cause chronic pancreatic insufficiency and diabetes mellitus. Hence, managing triglyceride levels is imperative in preventing these severe outcomes (3,9).

Diagnosis relies heavily on genetic confirmation due to overlapping clinical features with other lipid disorders, such as familial hyperchylomicronemia syndrome caused by mutations in Apo C-II and other lipid-associated genes (10).

The cornerstone of LPLD management remains strict dietary fat restriction, supplementation with MCTs, and avoidance of long-chain triglycerides. This dietary management has been proven effective in controlling triglyceride levels and significantly reducing pancreatitis frequency (3). Emerging therapeutic options include gene therapy and antisense oligonucleotide therapy, such as volanesorsen, which targets Apolipoprotein C-III, a natural inhibitor of LPL activity. Clinical trials have demonstrated significant reductions in triglyceride levels and pancreatitis episodes using these novel treatments.

A multidisciplinary approach involving geneticists, endocrinologists, metabolic dietitians, and primary care physicians is crucial for comprehensive management and optimizing outcomes (3). Given the rarity of LPLD, each reported case adds valuable insights into the clinical progression, management challenges, and potential therapeutic innovations.

Conclusion

This case highlights the significance of early genetic diagnosis and rigorous multidisciplinary management for LPL deficiency. It underscores the potential of novel therapeutic approaches and emphasizes the critical need for ongoing research and reporting to enhance understanding and treatment efficacy of this rare metabolic disorder.

List of Abbreviations

HDL	High-density lipoprotein
LCT	Long-chain triglycerides
LPLD	Lipoprotein lipase deficiency
MCT	Medium-chain triglycerides

Declaration of conflicting interests

The authors declare no conflict of interest related to this case report.

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Consent for publication

Written informed consent was obtained from the patient's parents for publication of this report and any accompanying images.

Ethical approval

Given the observational and noninterventional nature of this single case report, formal ethical approval was not required. Written informed consent was obtained from the patient's parents.

Consent for publication

Due permission was obtained from the parents of the patient to publish the case report.

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