



# Acute Ischemic Hepatitis due to Portal Vein Thrombosis Post Roux-en-Y Gastric Bypass: A Case Report

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## Abstract

A rare but potentially serious complication of portal vein thrombosis leading to acute ischemic hepatitis in a 39-year-old male post Roux-en-Y Gastric Bypass (RYGB) was the focus of the case report. Despite DVT prophylaxis measures, the patient developed ischemic hepatitis secondary to portal vein thrombosis as early as the first postoperative day. Imaging revealed left main portal vein thrombosis in the background of severe abdominal pain along with liver transaminases surge, prompting a shift in the course of management. This case report sheds light on the importance of early recognition and management of PVT-induced complications following bariatric surgery. The reported case adds valuable insights to the limited literature on ischemic hepatitis post-RYGB and highlights the need for further research to understand underlying mechanisms and identify high-risk patient populations.

**Keywords:** Acute ischemic hepatitis; Portal vein thrombosis; Roux-en-Y gastric bypass; Bariatric surgery; Postoperative complications

## Introduction

Obesity possesses major health consequences due to its association with the development of cardiovascular diseases, hypertension, diabetes mellitus, and hyperlipidemia. It is considered the second most common cause of preventable death secondarily to smoking [1]. The pursuit of weight loss through bariatric surgery, particularly Roux-en-Y Gastric Bypass (RYGB), has witnessed remarkable success in combating obesity-related health diseases. While Venous Thromboembolism (VTE) is one of the most common postoperative complications post-bariatric surgery, its incidence remains below 2% [2-12]. Nevertheless, within the successes of bariatric surgical interventions, a rare yet significant complication may emerge. Namely, Portal Venous System Thrombosis (PVST), a serious complication, may arise following bariatric surgery; with a combined overall occurrence rate of approximately 0.42% [13]. In this report, we present a case of acute ischemic hepatitis in the immediate postoperative period following RYGB.

## Case Presentation

A 39-year-old male with a medical background of Type I Diabetes Mellitus (T1DM), hypertension, sleep apnea, dyslipidemia, heavy smoking, and fatty liver presented to our clinic with severe gastroesophageal reflux symptoms and a Body Mass Index (BMI) of 39. The decision to undergo RYGB was attained based on the preoperative assessments, which included an upper GI endoscopy and routine laboratory tests. The endoscopy showed a small region suspicious of Barrett's esophagus, with histopathological analysis revealing squamous epithelium featuring intestinal metaplasia, but negative for dysplasia or malignancy. Intraoperatively, the procedure went smoothly without unexpected events other than minimal adhesiolysis. Our postoperative procedure protocol was strictly followed which included mechanical (TED stocking and pneumatic compressions) and pharmaceutical VTE prophylaxis. Heparin 5000 IU was administered subcutaneously upon induction of the anesthesia and continued in the postoperative period. The subsequent VTE prophylactic dose of 5000 IU was resumed eight hours following the surgery and the frequency was based on the VTE scoring system utilized at our institution. On the first postoperative day, the patient complained of severe upper abdominal pain requiring frequent high doses of narcotic administration. His laboratory tests showed significantly elevated liver transaminases (Figure 1). The diagnosis of ischemic hepatitis was proclaimed as suggested by ALT/LDH ratio <1.5. A cumulative liver panel during the patient's hospital stay is displayed in Table 1. Initially, the patient underwent a duplex ultrasound examination of the liver which failed to detect any abnormality explaining the surge of transaminases (Figure 2). Within the same postoperative day, the patient developed a

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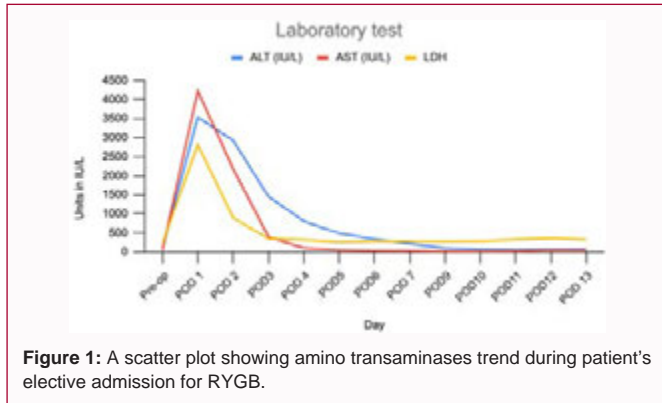
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**Figure 1:** A scatter plot showing amino transaminases trend during patient's elective admission for RYGB.

fever with a temperature of 37.8°C (100°F). A pursuit of Computed Tomography (CT) scan of the abdomen and pelvis without contrast was performed as the patient had difficult Intravenous (IV) access. The CT abdomen without IV contrast failed to detect any pathology in concordance to the patient's transaminases levels and fever. A subsequent CT of the abdomen and pelvis with IV contrast through a peripherally inserted central catheter PICC line showed a filling defect in the left main portal vein with resultant hypoattenuation of the left liver lobe. This finding raised concerns for hypoperfusion-ischemic changes secondary to thrombosis of the left main portal vein. The rest of the portal veins and hepatic veins showed no filling defects (Figure 3, 4). A drastic change in the management was based on such critical postoperative findings. The patient switched to therapeutic anticoagulation (enoxaparin 1 mg/kg BID) and admission to the Intensive Care Unit (ICU) for observation of the proclaimed acute ischemic hepatitis.

## Discussion

Following bariatric surgery, PVST is a relatively uncommon occurrence; however, it carries a potential lethality, with a mortality rate of 1.33% [13] and based on the literature, Portomesenteric and Splenic Vein Thrombosis (PMSVT) may manifest between 3 and 42 days following bariatric surgery [14]. Despite the low occurrence rates, PVST can occur in the early post-operative course and have serious adverse events, as did our patient. Early recognition of such complications plays a major role in preventing lethal and debilitating fulminant hepatitis. Several measures have been implemented after the diagnosis of portal vein thrombosis induced hepatitis which included therapeutic doses of pharmaceutical anticoagulation, mechanical anticoagulation (pneumatic compression and ted stocking), and early mobilization.

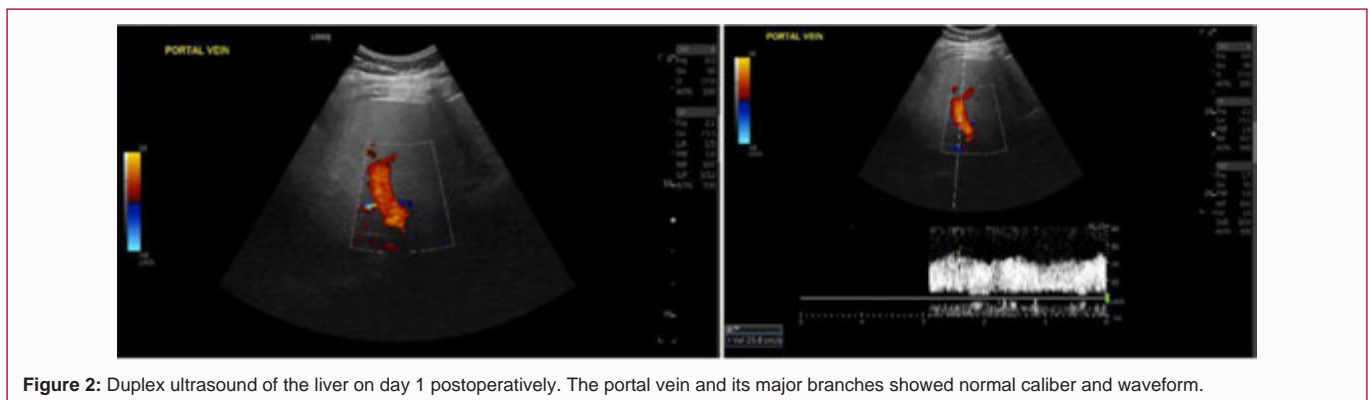
Multiple contributing factors potentiate thrombus formation during laparoscopic procedures including liver retraction, abdominal insufflation, and hypercoagulable states [15-23]. Liver retraction can induce parenchymal injury predisposing the endothelium to platelet adhesion and aggregation forming a plug, the first step in thrombus formation [24]. Subsequent coagulation cascade can be attenuated by reduced blood flow within the blood circulation and/or hypercoagulable state [18,19,22,24-26]. PMSVT may arise as a result of direct trauma to the portomesenteric circulation, a slowing of blood flow resulting from the ligation of the gastrointestinal vascular supply, and an inflammatory reaction triggered by the laparoscopic procedure [25].

Several studies have investigated predictors and timing factors associated with Portomesenteric Vein Thrombosis (PMVT) following bariatric surgery, shedding light on the multifaceted nature of this rare complication. Carlin et al. groundbreaking study elucidates

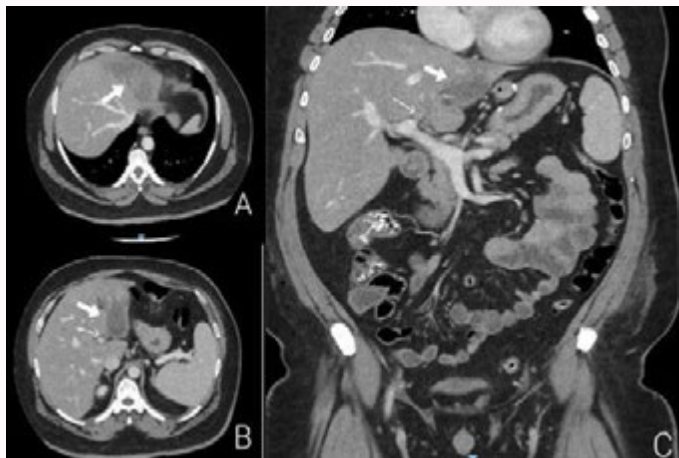
**Table 1:** Liver function panel during the patient's elective admission for RYGB.

Blood test	Pre-op	POD1	POD2	POD3	POD4	POD5	POD6	POD7	POD9	POD10	POD11	POD12	POD13
ALT (IU/L)	84	3534	2932	1455	814	492	339	227	106	75	63	74	79
AST (IU/L)	50	4226	2182	402	113	54	39	34	25	21	31	61	55
Total bilirubin (mg/dL)	7.8	19.9	29.7	31.8	29.1	24	21.4	21.8	22.7	18.4	15.5	12.9	13.2
Direct bilirubin (mg/dL)	1.6	4.2	7	9.4	8.9	7.1	5.7	5.7	7.2	5.3	3.9	2.6	3.8
ALP (IU/L)	72	65	80	89	91	91	93	84	77	70	70	71	76
GGT (IU/L)	229	221	298	317	310	276	256	214	168	144	134	130	137
LDH (IU/L)	229	2815	901	355	323	266	282	283	283	294	330	363	326
PLT (10 <sup>9</sup> /L)	207	40	51	38	79	92	158	213	262	208	185	179	198

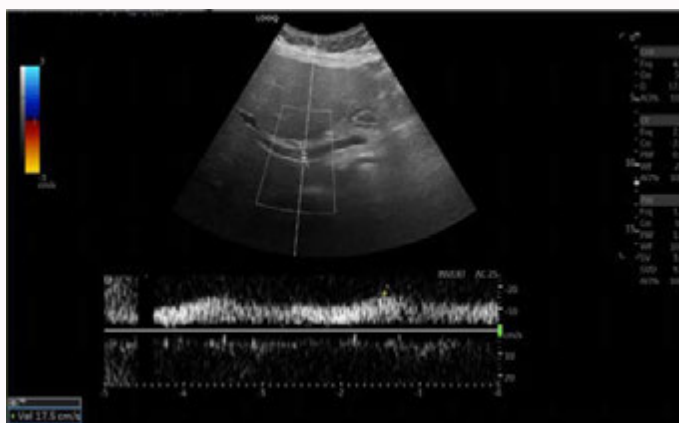
POD: Postoperative Day; ALT: Alanine Aminotransaminase; AST: Aspartate Aminotransaminase; ALP: Alkaline Phosphatase; GGT: Gamma-Glutamyl Transpeptidase; LDH: Lactate Dehydrogenase; PLT: Platelets



**Figure 2:** Duplex ultrasound of the liver on day 1 postoperatively. The portal vein and its major branches showed normal caliber and waveform.



**Figure 3:** Computed tomography of the abdomen during the porto-venous phase. A) an axial view demonstrated left lobe hypodensity suggestive of an ischemic insult (bold arrow) B) and C) are axial and coronal views at the bifurcation of the portal vein demarcating the left main portal vein filling defect which coincide with a thrombus formation (arrow).



**Figure 4:** A follow-up duplex ultrasound of the liver showed normal caliber and waveform of the portal vein with hepatopetal flow.

crucial independent predictors and timing factors associated with PMVT following bariatric surgery. It also offers a nuanced perspective on the multifaceted nature of this rare complication [27]. Notably, their identification of specific predictors such as history of Venous Thromboembolism (VTE), pre-existing liver disease, undergoing sleeve gastrectomy, and encountering serious postoperative complications expand granularity to our understanding of the risk profile for PMVT.

A meta-analysis by Shoar et al. offers supplementary evidence, indicating gastric bypass ranking as the second most likely procedure to result in Portomesenteric and Splenic Vein Thrombosis (PMSVT) following sleeve gastrectomy. This corroborative finding underscores the significance of surgical procedure selection in influencing the risk of PMSVT development. Interestingly, the meta-analysis by Shoar et al. provides a broader perspective on the procedural factors associated with PMSVT, supporting the notion that the type of bariatric surgery plays a crucial role in the occurrence of such complications. Combining these insights from both studies, it is evident that distinct surgical approaches may confer varying degrees of risk for PMSVT [28]. As a result, it emphasizes the need for clinicians to consider procedural nuances and patient-specific factors in their risk assessment and management strategies [28].

The study by Frattini et al. offers valuable insights into the clinical implications of early recognition in cases of Portomesenteric Vein Thrombosis (PMVT). Early identification of PMVT is crucial for prompt intervention and the initiation of appropriate therapeutic measures, ultimately leading to improved patient outcomes. This underscores the necessity for healthcare professionals in the field of bariatric surgery to maintain a high index of suspicion for PMVT, particularly in patients with predisposing risk factors. Such vigilance enables proactive measures to be taken, helping to mitigate potential complications associated with such rare yet serious conditions [26].

## Conclusion

The case elucidated herein seems to be the first documented report of ischemic hepatitis in the background of isolated left portal vein thrombosis that occurred during the first-day post-RYGB. This distinctive presentation emphasizes the importance of early recognition of ischemic hepatitis as a potential consequence of portal vein thrombosis post-RYGB as early as the first postoperative day. Further research is essential to understand the underlying mechanisms of portal venous system thrombosis post bariatric surgery and identify high-risk patient populations.

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