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Case Report

Catastrophic Post-op Complication of Acute Ischemic Liver Failure Secondary to Hepatic Artery Dissection Following Portal Vein Aneurysmorrhaphy

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Abstract

Acute liver failure secondary to acute hepatic artery occlusion is a rare but catastrophic event. We present the case of a 74-year-old male patient who developed acute ischemic liver failure following portal vein thrombectomy and aneurysmorrhaphy. Despite subsequent surgical and interventional attempts to restore hepatic perfusion, the patient's condition rapidly deteriorated, leading to multi-organ failure and death. This case underscores the importance of early recognition and aggressive management of hepatic artery thrombosis to prevent irreversible liver damage.

Keywords: acute liver failure, portal vein thrombosis

Introduction

Acute liver failure (ALF) is a severe clinical syndrome characterized by the rapid onset of liver dysfunction, which often leads to encephalopathy and coagulopathy. While various etiologies contribute to ALF, ischemic liver injury due to hepatic artery occlusion is a rare but serious cause [1]. Hepatic artery thrombosis can result from a multitude of conditions, including, but not limited to, stasis, surgical trauma, and hypercoagulability status. The liver's dual blood supply, primarily from the portal vein and partially from the hepatic artery, generally provides a safeguard against ischemia; however, in cases of portal vein thrombosis, the liver becomes heavily reliant on hepatic arterial flow. Acute occlusion of the hepatic artery in this context can precipitate extensive liver necrosis, leading to acute liver failure [3].

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Case Description

A 74-year-old male with a history of hypertension, tobacco dependence, and alcohol use, presented to the ED with a two-week history of lower abdominal pain radiating to the back, associated with symptoms of nausea and decreased oral intake. Physical exam showed RUQ tenderness to palpation, and initial imaging revealed a mass-like abnormality in the porta hepatis, identified as a portal vein aneurysm with associated thrombosis extending into the portal, splenic, and superior mesenteric veins. See Table 1 for lab work on admission. The patient was initially managed with anticoagulation, but due to worsening abdominal pain and distension, surgical intervention was required.

During surgery, a portal vein thrombectomy and aneurysmorrhaphy with distal control of the portal vein and hepatic artery were performed. Postoperatively, the patient exhibited a significant rise in liver enzymes and lactic acid levels, initially attributed to reperfusion injury. However, subsequent imaging revealed thrombosis of the hepatic artery with extensive ischemic infarction of multiple liver segments. Despite endovascular stenting of the hepatic artery, the patient's condition rapidly deteriorated, progressing to acute liver failure, respiratory failure, renal failure, and eventual death before a liver transplant could be arranged.

Labs	On Admission	Reference Values
WBC	16.6 cells/mL (H)	4.0 - 10.6 cells/mL
Hgb	7.2 g/dL (L)	12.0 - 16.0 g/dL
Hct	20%(L)	36 - 48%
Albumin	2.3 g/dL (L)	3.4 - 5.0 g/dL
T Bili **Direct** **Indirect**	2.78 mg/dL (H) 1.69 mg/dL (H) 1.53 mg/dL (H)	0.20 - 1.00 mg/dL 0.00 - 0.20 mg/dL 0.20 - 1.20 mg/dL
Alk Phos	264 IU/L (H)	50 - 136 IU/L
AST	5252 IU/L (H)	15- 37 IU/L
ALT	3209 IU/L(H)	14 - 59 IU/L
INR	2.33 (H)	0.89 - 1.07
PT	24 seconds (H)	9.8 - 11.7 seconds
aPTT	> 139 seconds (H)	24.3 - 30.4 seconds

Table 1. Lab Values on Admission

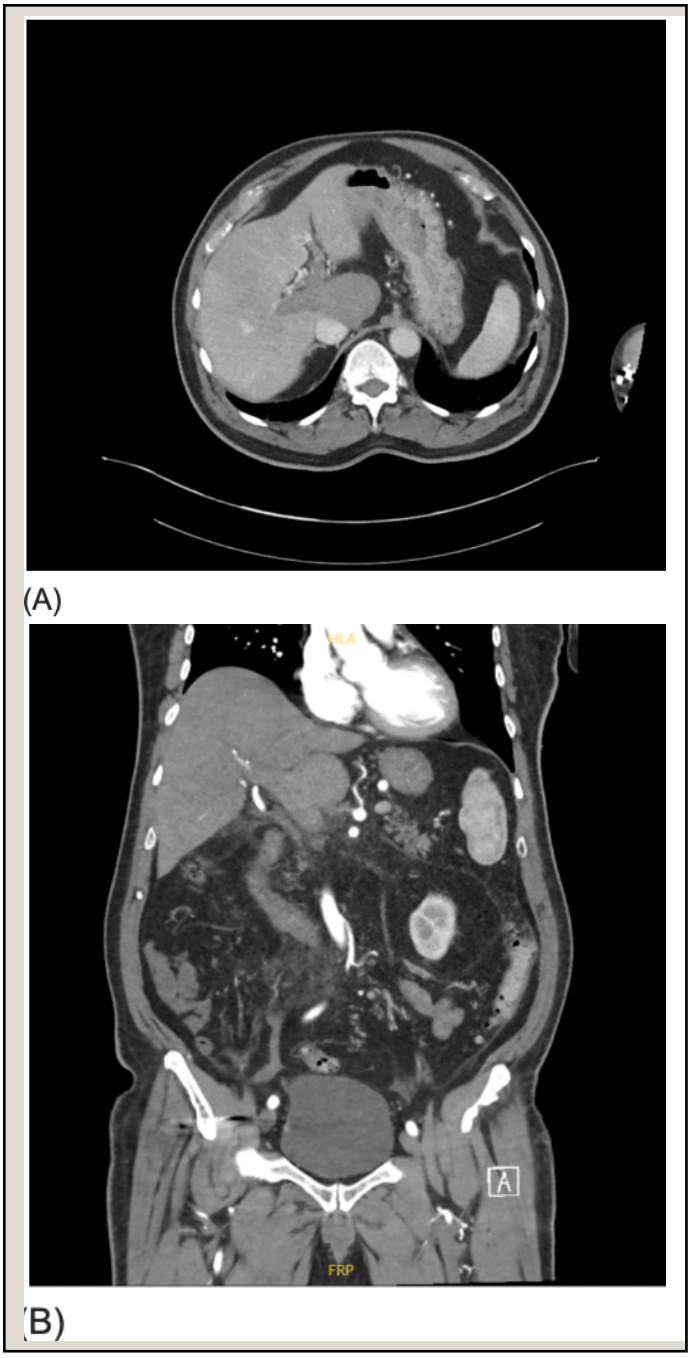

Figure 1. Upon admission, CT with contrast imaging of patient's abdomen was performed, showcasing large common hepatic artery aneurysm in 2 views. (A) Transverse View. (B) Coronal View.

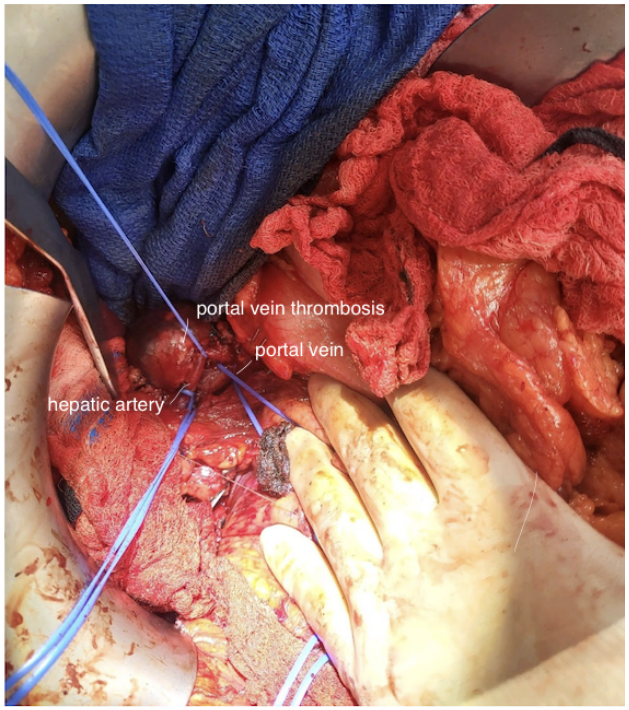

Figure 2. Intraoperative Photograph

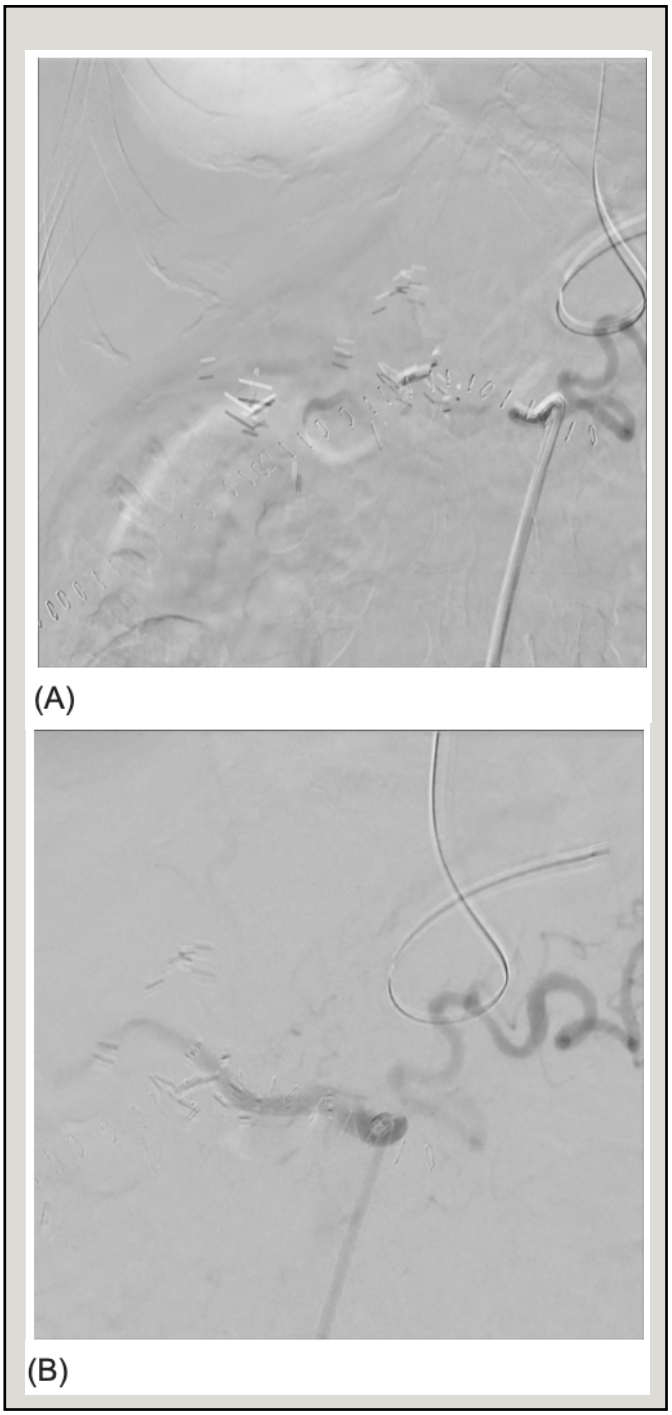

Figure 3. CT angiogram prior (A) and post (B) placement of stent. Cannulated celiac access injected contrast. (A) Contrast clearly seen within splenic artery but not in hepatic artery, indicating disruption to blood flow in hepatic artery. (B) Placement of stent following balloon angioplasty allowed for reestablishment of blood flow through the common hepatic artery.

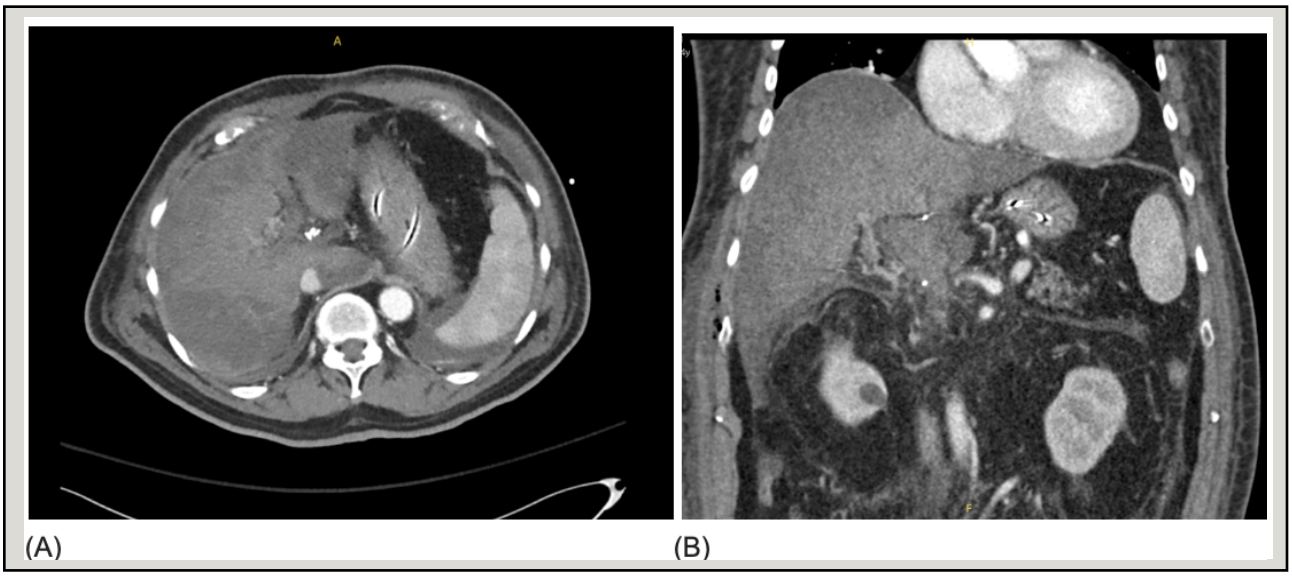

Figure 4. CT imaging of abdomen following balloon angioplasty and stent placement in hepatic artery. Extensive ischemic damage to hepatic tissue visualized.

Discussion

Acute ischemic liver failure, though uncommon, is a well-documented phenomenon in the context of hepatic artery occlusion [2]. The liver's vulnerability to ischemia is exacerbated when portal venous flow is compromised, as seen in conditions like portal vein thrombosis. According to studies, hepatic artery thrombosis following liver surgery or trauma can lead to extensive liver necrosis, with mortality rates exceeding 70% in some cases [5]. Early diagnosis and intervention are critical; however, the prognosis remains poor, especially when multi-organ failure sets in.

The pathophysiology of ischemic liver injury involves a cascade of cellular events, including ATP depletion, oxidative stress, and inflammatory responses, ultimately culminating in hepatocyte necrosis. Reperfusion injury, which may occur after restoring arterial flow, can further exacerbate liver damage. Current management strategies focus on restoring perfusion through surgical or endovascular techniques, but the role of liver transplantation becomes paramount when irreversible liver damage has occurred [4]. Unfortunately, the window for successful transplantation is often narrow, and patient outcomes are heavily influenced by the timing of referral and intervention.

Acute hepatic artery occlusion, particularly in the setting of portal vein thrombosis, poses a significant risk for the development of acute liver failure. The liver's unique dual blood supply generally protects against ischemic injury; however, when portal vein flow is compromised, the hepatic artery becomes critical for liver perfusion [3]. In this patient, the occlusion of the hepatic artery following surgery led to massive liver ischemia, a catastrophic event that was refractory to all attempted interventions.

The rapid progression from hepatic artery thrombosis to multi-organ failure highlights the challenges in managing such cases. While endovascular techniques such as stenting can restore arterial flow, the success of these interventions largely depends on the timing and extent of liver damage prior to revascularization. In cases where liver function

deteriorates rapidly, as seen in this patient, liver transplantation may be the only viable option [4]. Unfortunately, due to rapid clinical decline, this patient did not survive long enough to undergo transplantation.

Conclusion

This case of acute liver failure secondary to hepatic artery occlusion highlights the lethal potential of ischemic liver injury in the setting of compromised portal vein flow. Despite aggressive surgical and interventional management, the rapid progression to multi-organ failure proved fatal. This case emphasizes the need for early recognition and expedited management, including consideration for liver transplantation, in patients at high risk for ischemic liver failure. Further research into optimizing prophylactic and therapeutic strategies for hepatic artery occlusion is warranted to improve outcomes in this challenging clinical scenario.

References

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