CASE REPORT

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CARDIOVASCULAR SURGERY AND INTERVENTIONS

Successful surgical management of hepatic artery injury during cholecystectomy

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ABSTRACT

Iatrogenic hepatic artery injury during cholecystectomy is a serious complication, often exacerbated by inflammation and anatomical variations of the vascular structures. In this case report, a 16-year-old patient undergoing laparoscopic cholecystectomy for cholecystitis sustained a hepatic artery injury. The cardiovascular surgery team performed an interposition graft using the saphenous vein to restore arterial flow. Systemic heparinization was administered intravenously at a dose of 100 IU/kg before vascular clamping. Hemostasis was achieved through temporary clamping of the celiac trunk branches. Contrast-enhanced computed tomography angiography on postoperative day 5 confirmed the patency of the graft. In cases where bile duct and hepatic artery injuries occur simultaneously, a multidisciplinary approach is essential to improve patient outcomes and minimize complications.

Keywords: Hepatic artery, cholecystectomy, saphenous vein graft, pediatric vascular injury.

Iatrogenic injury to the hepatic arteries during cholecystectomy is a significant and potentially life-threatening complication. Inflammatory changes in the hepatobiliary region and anatomical variations in vascular structures can complicate surgical dissection and increase the risk of such injuries. The incidence of combined injury to the extrahepatic bile ducts and hepatic afferent vessels has been reported to be approximately 30%, which can severely compromise the patient's overall clinical condition. Bile duct injury during cholecystectomy remains a serious and potentially fatal complication. Over the past two decades, studies have reported that the incidence of complications associated with laparoscopic cholecystectomy ranges from 0.5% to 1.4%.[1] Concomitant injury to hepatic vessels and bile ducts significantly increases patient mortality.[2-4] Clinical studies have reported the incidence of combined extrahepatic bile duct and hepatic artery injuries during cholecystectomy to range from 13.8% to 26%.[3,5] Due to limited experience in some centers, standardized treatment strategies for managing such complex cases have not been fully established. In this study, we present a case of successful surgical management of a hepatic artery injury sustained during cholecystectomy.

CASE REPORT

Informed consent was secured from the patient for the publication of this case and the accompanying images.

A 16-year-old female patient with a known history of symptomatic cholelithiasis presented to the emergency department with nausea, right upper quadrant pain radiating to the shoulder, fever, chills, and generalized fatigue. On admission, the body temperature was 38.5 °C. Laboratory tests showed elevated inflammatory markers: C-reactive protein 98 mg/L; amylase: 44 U/L; lipase: 26 U/L. Abdominal ultrasonography revealed gallbladder wall thickening and multiple stones consistent with acute cholecystitis. The patient was admitted to the pediatric surgery service and scheduled for elective laparoscopic cholecystectomy following stabilization.

During the laparoscopic procedure, significant arterial bleeding was encountered in the hepatobiliary region, which could not be adequately controlled using minimally invasive methods. Due to impaired visualization and the need for vascular repair, the procedure was converted to open cholecystectomy. Intraoperative findings

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prompted an urgent consultation with the cardiovascular surgery team. Hemostasis was initially achieved by temporary vascular clamping of the celiac trunk branches using atraumatic vascular clamps. Further exploration revealed a full-thickness transection of the proper hepatic artery. Systemic anticoagulation was initiated with intravenous heparin at a dose of 100 IU/kg prior to vascular repair.

A saphenous vein graft was harvested from the lower extremity, and an interposition graft was performed to restore arterial continuity (Figure 1). Concurrently, due to the associated bile duct injury, the general surgery team performed a Roux-en-Y hepatojejunostomy for biliary reconstruction. The patient was transferred to the pediatric intensive care unit postoperatively. Recovery was uneventful, and no inotropic support was required.

Liver function tests—aspartate aminotransferase, alanine aminotransferase, and gamma-glutamyl transferase—along with bilirubin levels, gradually returned to normal. To protect the vascular graft, low molecular weight heparin therapy was initiated. On postoperative day 5, contrast-enhanced computed tomography angiography confirmed the patency of the hepatic artery and adequate graft perfusion (Figure 2). The patient was discharged in stable condition after full clinical and biochemical recovery.

DISCUSSION

Hepatic artery injuries during laparoscopic cholecystectomy are rare but potentially life-threatening complications, especially in the presence of inflammation, anatomical variations, or surgical inexperience. In our case, conversion to open surgery was essential for adequate exploration and vascular control. This approach allowed for prompt identification and successful repair of the hepatic artery using a saphenous vein interposition graft.

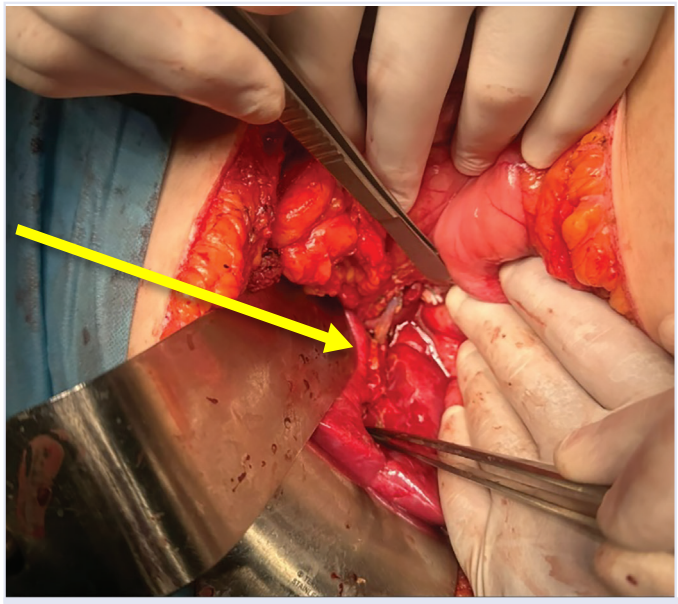

Figure 1. Intraoperative image showing hepatic artery repair with saphenous vein interposition graft. The saphenous vein graft is visible between the proximal and distal hepatic artery segments (yellow arrow).

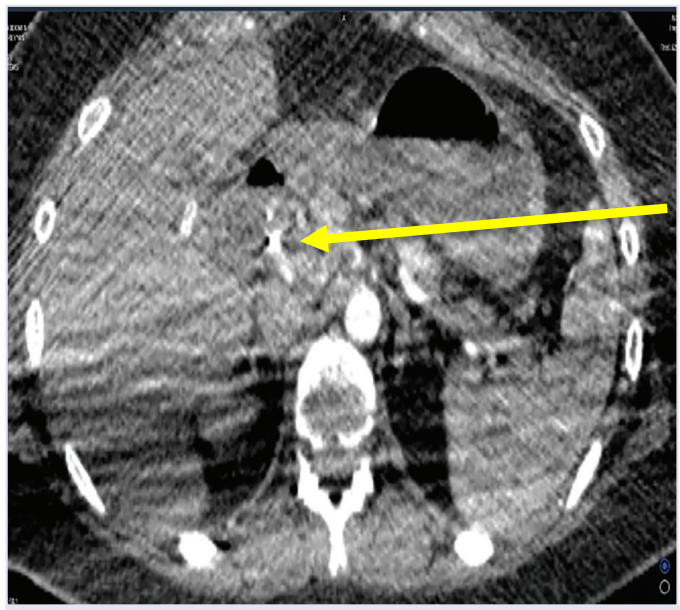

Figure 2. Postoperative CT angiography showing patent saphenous vein graft on postoperative day 5. White arrow indicates the course of the graft and confirms arterial continuity without thrombosis (yellow arrow).
CT: Computed tomography.

Although some studies suggest that isolated hepatic artery injuries may not require revascularization due to intrahepatic collateral flow,[1] this may not apply to pediatric patients, whose collateral networks are often underdeveloped. In such cases, prompt surgical intervention is necessary to prevent ischemia-related liver damage.

This case is particularly notable due to the patient's young age and the successful use of a saphenous vein graft for arterial reconstruction. While most hepatic artery injuries occur in adults, pediatric cases are extremely rare. A recent report by Akış Yıldız et al.[3] described a 6-year-old child with a similar vascular injury during laparoscopic cholecystectomy, underscoring both the rarity and the technical complexity of such cases in children. Ferrada et al.[4] emphasized that combined biliary and vascular injuries may necessitate aggressive interventions such as percutaneous revascularization or staged hepatectomy. However, early recognition and immediate surgical repair can help avoid more extensive hepatic resections.

Although Singla et al.[1] suggested that injuries to the right hepatic artery may not significantly affect mortality due to collateral circulation, this does not hold true for all pediatric patients. Therefore, early revascularization should be prioritized in children. Furthermore, existing literature supports the feasibility and durability of saphenous vein grafts in emergency hepatic artery reconstruction.[2,5] In our case, the uneventful postoperative course and the documented graft patency on imaging support this approach.

In conclusion, hepatic artery injury in pediatric patients, though rare, requires prompt recognition and coordinated management. Saphenous vein interposition grafting can be an effective method to restore arterial continuity when performed early and in conjunction with definitive biliary repair. This case highlights the importance of multidisciplinary collaboration in achieving favorable outcomes in complex hepatobiliary injuries.

Ethics

Informed Consent: Informed consent was secured from the patient for the publication of this case and the accompanying images.

Footnotes

Authorship Contributions

Concept: E.A., C.K., S.M.Ş.T., Z.G.; Design: E.A., C.K., S.M.Ş.T., Z.G.; Data Collection or Processing: E.A., C.K., S.M.Ş.T., Z.G.; Analysis or Interpretation: E.A., C.K., S.M.Ş.T., Z.G.; Literature Search: E.A., C.K., S.M.Ş.T., Z.G.; Writing: E.A., C.K., S.M.Ş.T., Z.G.

Conflict of Interest: No conflict of interest was declared by the authors.

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