**CASE REPORT**

**Cholecystitis and Cholangitis during Continuous Renal Replacement Therapy in a Patient with Retroperitoneal Hemorrhage Requiring Large Amounts of Contrast Medium for the Assessment and Intervention**

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**Abstract:**
Intravenous use of contrast medium (CM), which may cause kidney dysfunction, is admissible for hemodialysis patients because of the efficient removal by hemodialysis. We herein report a 61-year-old woman on hemodialysis who suffered from cholecystitis and cholangitis after large-volume CM administration during continuous renal replacement therapy. After catheter ablation, she developed life-threatening retroperitoneal hemorrhage, which led to the use of 500 mL CM for 5 consecutive days. It should be kept in mind that excessive vicarious CM excretion in the biliary system may become a predisposing factor of cholecystitis and cholangitis in patients who frequently undergo radiological interventions and imaging.

**Key words:** complication, hemodialysis, vicarious contrast medium excretion, radiological intervention, catheter intervention

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**Introduction**

Contrast medium (CM) is widely used during computed tomography (CT) and therapeutical interventions but may lead to kidney dysfunction. For hemodialysis patients, the intravenous use of CM is permissible, when necessary, as CM can be efficiently removed from the blood by hemodialysis. However, rare comorbidities induced by CM should be kept in mind, even in such patients.

We herein report a case of cholecystitis, cholangitis, and mild (when present) pancreatitis following excessive vicarious contrast media excretion (VCME) via the liver in the bile during continuous renal replacement therapy (CRRT) after catheter ablation complicated with retroperitoneal hemorrhage.

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**Case Report**

A 61-year-old woman on maintenance hemodialysis who had no marked medical history related to biliary tract disorders, including choledolithiasis, cholecystitis, and choledocholithiasis (Fig. 1), received cryoablation for paroxysmal atrial fibrillation. After the procedure, she developed hypotension and transfusion-dependent anemia due to retroperitoneal hemorrhage 122 mm×172 mm×113 mm in diameter requiring 5 evaluations by contrast CT and 3 emergent interventional radiology procedures (Fig. 2). CRRT was performed instead of hemodialysis while she was in a hemodynamically unstable condition. Although the bleeding was brought under control during intubation from postoperative day (POD) 3 to 8, cholecystitis and cholangitis became increasingly visible as serious issues; plain CT on POD 1 depicted obvious gallbladder and common bile duct opacification without any symptoms (Fig. 3A), followed by biliary en-
zyme elevations. On POD 4, the unenhanced liver attenuation value increased from 60 Hounsfield units (HU) at baseline to 90.5 HU (Fig. 3B). Although the onset of symptoms, such as abdominal pain or nausea could not be evaluated during the tracheal intubation, the patient complained of abdominal discomfort soon after extubation on POD 8, with a fever, jaundice, and leukocytosis. Plain CT on POD 9 and ultrasonography on POD 13 revealed intrahepatic and extrahepatic biliary dilation (Fig. 4A, 4B), and contrast CT on POD 13 demonstrated a distended gallbladder with contrast-enhanced thickened wall (Fig. 4C), which led to the diagnosis of cholecystitis and cholangitis with moderate severity (1, 2). Serum pancreatic amylase level was elevated above 1,000 U/L on POD 13, but contrast CT demonstrated neither obvious swelling of the pancreas nor peripancreatic inflammation findings (Fig. 5). While these results did not strongly suggest the presence of typical pancreatitis, the incessant abdominal pain and high level of ascitic amylase on POD 15 (Table) supported the possible presence of mild pancreatitis (3).

All of these symptoms and laboratory data gradually im-
Figure 4. The CT and ultrasonography findings on PODs 9 and 13. (A) Plain CT image on POD 9. (B) Ultrasonography of common bile duct on POD 13. (C) Contrast CT image on POD 13. The common biliary duct (red arrow) was dilated to 14 mm on POD 9, and ultrasonography on POD 13 detected the same finding (yellow arrow), with the diameter of the common biliary duct measuring 10 mm. In addition, contrast CT on POD 13 indicated cholecystitis with fully circumferentially enhanced gallbladder wall thickening (red arrowhead) compared to POD 4.

Figure 5. The contrast CT findings on POD 13. Contrast CT showed no obvious swelling of the pancreas or peripancreatic inflammation.

Table. Findings from the Peritoneal Fluid Sample on POD 15.

| Peritoneal fluid sample   |   |
|---------------------------|---|
| Total protein             | 3.2 g/dL |
| Albumin                   | 2 g/dL  |
| Lactate dehydrogenase     | 4,119 U/L |
| Total bilirubin           | 11 mg/dL |
| Direct bilirubin          | 2 mg/dL  |
| Triglyceride              | 42 mg/dL |
| Amylase                   | 606 U/L  |

POD: postoperative day

proved with conservative management using antibiotics within a month. The patient was discharged on POD 46 (Fig. 6).

Discussion

Ordinal hemodialysis eliminates 70-80% of CM within 4 hours (4), whereas 1-2% of CM is vicariously excreted through hepatocytes, even in patients with a normal renal function (5). VCME typically occurs after injecting CM without causing any noticeable symptoms, but the current case demonstrated that the prolonged stagnation of CM in the biliary system could represent a predisposing factor for inflammation of the gallbladder, bile duct, and pancreas. The physical findings, including the incessant abdominal pain, fever, and jaundice, as well as the laboratory data and ultrasonography and CT findings met the criteria of acute cholecystitis and cholangitis according to the Tokyo Guidelines 2018 (1, 2). Acute pancreatitis was also diagnosed based on the following criteria: abdominal pain together with the elevation of the serum pancreatic amylase concentration (3); however, the CT findings did not strongly suggest the presence of strong pancreatic inflammation. Thus, we considered that even if the patient developed pancreatitis, the disease severity would be mild.

We suspected three potential underlying causes for the CM accumulation: the method of renal replacement, the contrast volume, and the type of CM. First, because the blood flow rate, dialysis flow rate, and size of the dialyzer are lower in CRRT than in hemodialysis, the removal effi-
The clinical course of the patient. Repeated contrast-enhanced CT (gray arrows) evaluations were performed for the retroperitoneal hematoma. We noted gallbladder opacification (GBO) (black arrows) for five consecutive days. The white blood cell count and bilirubin and γ-GTP levels were elevated from POD 6, followed by the elevation of pancreatic amylase levels. These data gradually improved with conservative therapy of antibiotics, and the patient was discharged on POD 46.

The authors state that they have no Conflict of Interest (COI).

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