

# Extracorporeal Hepatic Resection and Autotransplantation for Primary Gastrointestinal Stromal Tumor of the Liver

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## ABSTRACT

We report a case of primary gastrointestinal stromal tumor of the liver. A 60-year-old woman with a large mass in the liver was asymptomatic with no hepatic virus infection and negative tumor markers. Because the tumor was unresectable by conventional means, we used extracorporeal hepatic resection and autotransplantation (ECHRA) for operation. The pathology showed a gastrointestinal stromal tumor that was diagnosed based on positive immunostaining for c-kit and CD34. Mutation analysis revealed an acquired mutation in exon 11 of c-kit. As we know, this is the eighth case of a primary hepatic extragastrointestinal stromal tumor reported previously in English, and the first case of which that was treated with ECHRA.

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**G**ASTROINTESTINAL STROMAL TUMORS (GISTs) are mesenchymal tumors occurring in the alimentary tract characterized by the expression of the KIT protein (CD117) [1]. GISTs are typically found in the gastrointestinal tract, but they do rarely occur outside the gastrointestinal tract, in which case they are known as extragastrointestinal stromal tumors (EGISTs) [2]. EGISTs have been commonly reported in the mesentery, omentum, or retroperitoneum [3], and sporadically in the pancreas [4], gallbladder [5], liver [6], and several other organs. We herein report a rare surgical case of EGIST of the liver that was confirmed by histologic and immunohistochemical diagnosis. To the best of our knowledge, this is the first report published on a patient who underwent extracorporeal hepatic resection and autotransplantation (ECHRA) for hepatic EGIST.

## CASE REPORT

### History

A 60-year-old Chinese woman without any symptoms was admitted to the hospital because of a hepatic mass detected during a routine examination. The patient denied abdominal pain, nausea, vomiting, chills, fevers, diarrhea, or hematemesis. There was no history of hepatitis or weight loss. Results of an abdominal physical examination were normal. Laboratory studies showed negative hepatitis B surface antigen, hepatitis C virus, carcinoembryonic antigen, alpha fetoprotein, carbohydrate antigen 19-9, carbohydrate antigen 12-5, and carbohydrate antigen 15-3. Blood biochemistry was

normal except for a  $\gamma$ -glutamyl transpeptidase level of 53.1 U/L which was slightly increased. Chest radiograph, gastroscopy, and colonoscopy were also negative.

### Image Findings

Abdominal computed tomography (CT) and magnetic resonance imaging showed a large distinct oval mass with a maximum diameter of 12.8 cm in the liver, occupying S1, 4, 5, and 8. The mass showed mixed low density on plain CT scan, and abundant peri- and intratumoral feeding arteries on early arterial phase (Fig 1). The solid parts of the mass showed moderate and sustained enhancement (from 38HU to 74HU) on late arterial, venous, and delayed phases. There were multiple cystic areas without enhancement within the mass containing old (hypointense on T2WI) and subacute hemorrhage (hyperintense on T1WI) and level-level planes. Adjacent portal veins, hepatic veins, and biliary tracts were pressed and displaced. There was neither hepatic cirrhosis nor portal hypertension (enlarged spleen, ascites). No enlarged lymph nodes and metastatic lesions could be detected.

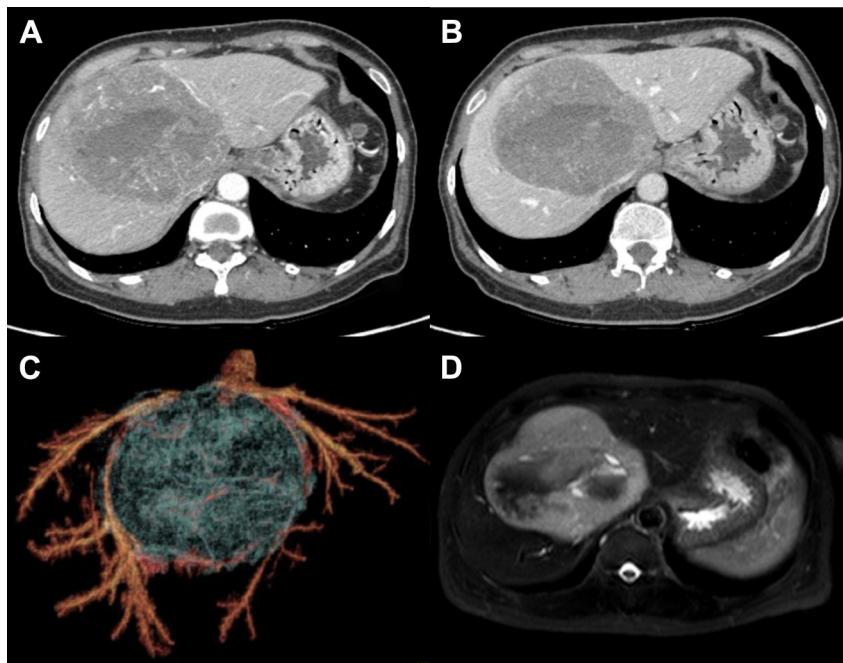
### Preoperative Evaluation

Because of the possibility of a hepatic malignant tumor, a resection of the mass was performed. But this tumor was conventionally

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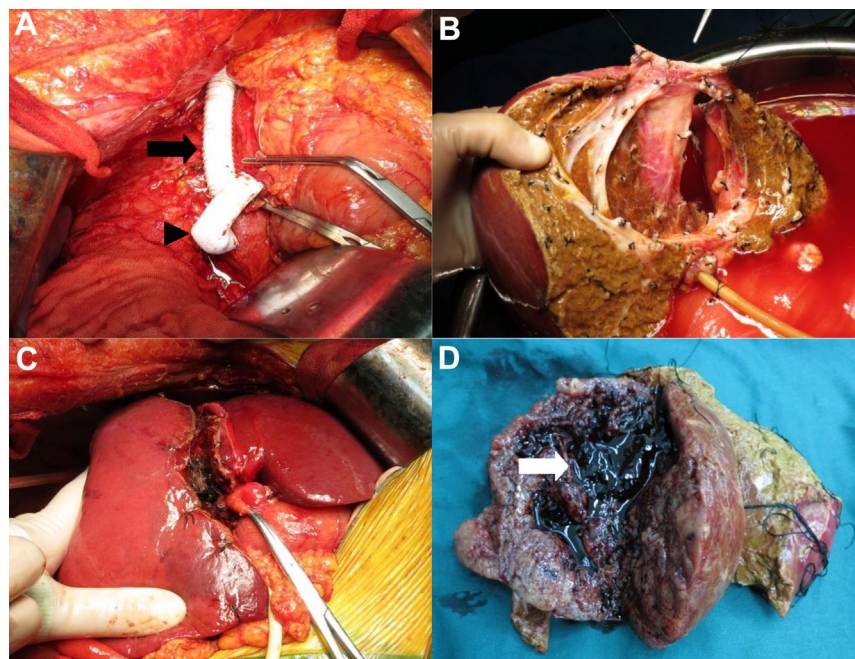
**Fig 1.** Abundant peri- and intratumoral feeding arteries on early arterial phase (A). The solid parts of the mass showed moderate and sustained enhancement (B). MRI showed there was old and sub-acute hemorrhage in tumor (D). IVC, LHV, and RHV were compressed and the MHV was obscured (C).

unresectable because the inferior vena cava (IVC), left hepatic vein (LHV), and right hepatic vein (RHV) were compressed and the middle hepatic vein (MHV) was obscured. So we decided to use the ECHRA technique. The Indocyanine green retention rate at 15 minutes was 9.8 %. We planned to reserve the S 2, 3, 6, and 7, for which the volume estimated by three dimensional multidetector CT (3D-MDCT) was 601 mL. Therefore, the RFLV (remnant functional liver volume)/SLV (standard liver volume) was 52% and KICG (indocyanine green clearance) of the future liver remnant

was 0.08, which exceeded the safe limits (RFLV/SLV > 40% [7], and KICG of the future liver remnant > 0.05[8]).

#### Operative and Postoperative Data

ECHRA was performed as described previously [9] with three modifications. First, we used artificial vessel (AV graft) to replace retrohepatic inferior vena cava to restore the systemic circulation (Fig 2). Second, a temporary portacaval shunt was used during the



**Fig 2.** (A) AV graft to replace the RHIVC (black arrow), and a temporary portacaval shunt (black arrow head). (B) An anterior view of the liver autograft after resection of the tumor. (C) Re-implantation of the graft. (D) Hemorrhage (white arrow) in tumor.

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