ISSN 2689-8268 | Volume 8

American Journal of surgery and Clinical Case Reports

Case Report Open Access

Living Donor Liver Transplantation for Unresectable Colorectal Liver Metastases: Expanding Curative Options in Selected Patients

Angelica Maria Lucchese[1*], Nathalia Beck[2], Mayara Machry[1], Rodrigo Mariano[1], Tiago Auatt Paes Remonti[3], Santiago Cassales Neto[4], Flavia Feier[1] and Antonio Nocchi Kalil[1]

[1]Digestive Surgeon, Santa Casa de Porto Alegre, Department of Hepato-Biliary- Pancreatic Surgery and Liver Transplantation - Porto Alegre (RS), Brazil

[2]General Surgery Department, Santa Casa de Porto Alegre, Brazil

[3]Oncological Surgeon, Santa Casa de Porto Alegre, Department of Hepato- Biliary-Pancreatic Surgery and Liver Transplantation - Porto Alegre (RS), Brazil

[4]Gastroenterologist, Santa Casa de Porto Alegre, Department of Hepato-Biliary- Pancreatic Surgery and Liver Transplantation - Porto Alegre (RS), Brazil.

[*]Corresponding Author:
Angelica Maria Lucchese, Digestive Surgeon, Santa Casa de Porto Alegre, Department of Hepato-Biliary-Pancreatic Surgery and Liver Transplantation - Porto Alegre (RS), Brazil

Received: 22 May 2025

Accepted: 01 Jun 2025

Published: 05 Jun 2025

J Short Name: AJSCCR

Citation: AM Lucchese. Living Donor Liver Transplantation for Unresectable Colorectal Liver Metastases: Expanding Curative Options in Selected Patients. Ame J Surg Clin Case Rep. 2025; 8(16): 1-2

1. Introduction

Colorectal cancer (CRC) is the third most commonly diagnosed malignancy worldwide and the second leading cause of cancer-related death. Hepatic metastases occur in up to 50% of CRC patients during the disease course, yet only about 20% of these are initially eligible for curative-intent liver resection [1-2].In patients with unresectable colorectal liver metastases (CRLM) confined to the liver, systemic chemotherapy has long been the standard of care, though long- term survival remains poor. Recently, liver transplantation (LT) has emerged as a potential curative option in highly selected patients, especially following the encouraging results of the SECA I and II trials and the TRANSMET randomizedcontrolled trial, which demonstrated a 5-year overall survival (OS) rate exceeding 70% in the LT group versus less than 10% in the chemotherapy-only group [6].Despite these promising outcomes, LT for CRLM remains controversial due to organ scarcity and ethical concerns regarding organ allocation. In this context, the use of living donor liver transplantation (LDLT) may help expand access while preserving the deceased donor pool. We report a successful LDLT case for isolated, unresectable CRLM in a young female patient.

2. Case Report

A 48-year-old woman with no comorbidities presented in March 2023 with acute obstructive abdomen. Her initial CEA was 3.2 mg/dL. An emergency proctosigmoidectomy was performed. Pathology confirmed a moderately differentiated adenocarcinoma, 5.5 cm in size, with negative margins and no lymph node involvement (0/16). Immunohistochemistry revealed microsatellite stability, BRAF wild type, and KRAS mutation (p.G12V).On postoperative day 15, the patient developed jaundice. Abdominal CT showed three hypovascular hepatic nodules, the largest (3.2 x 2.2 cm) at segment IV near the hepatic hilum, causing bile duct dilatation. Two additional lesions (1.3 cm and 1.1 cm) were seen in segments III/IV and IV-A/VIII.In May 2023, MRI confirmed multiple nodular lesions throughout the liver parenchyma, with diffusion restriction. The dominant hilar lesion measured 2.6 cm and involved the biliary confluence. Bilobar external percutaneous biliary drainage was performed. Following clinical and biochemical improvement, chemotherapy with FOLFOX was initiated (6 cycles over 4 months).September 2023 MRI showed partial response with lesion size reduction (largest to 2.0 x 1.5 cm). Bevacizumab was added. By December, the largest lesion reduced to 1.2 cm but still caused biliary confluence involvement. PET-CT confirmed hypermetabolic liver lesions without nodal or extrahepatic disease.The patient met TRANSMET criteria for LT and underwent living donor evaluation. Her sister (B+, matched anthropometry) was approved.Right lobe LDLT was performed on July, 2024, preserving the middle hepatic vein for the donnor. V8 vein was reconstructed to the right hepatic vein using an iliac vein allograft. Arterial anastomosis was performed micro surgically between the graft's right hepatic artery and recipient's common hepatic artery.Postoperative course was notable for a biliary fistula, managed conservatively. At10-month follow-up, the patient remained stable with no signs of recurrence.

3. Discussion

LT for CRLM represents a paradigm shift in oncology. Traditionally a contraindication, it is now reconsidered for patients with isolated hepatic metastases and favorable biology. The main concern remains organ scarcity and ethical allocation, especially when competing with indications with higher curative potential. Strategies such as LDLT, split grafts, and extended criteria donors have been proposed to mitigate this limitation.Initial success came from the Oslo SECA I trial, showing 5-year OS of 60% [4]. The SECA II trial introduced stricter criteria (response to chemo, disease-free interval ≥1year, limited tumor burden), enhancing outcomes [5]. More recently, the randomized TRANSMET trial confirmed a 5-year OS of 73% in the LT group versus 9% in chemotherapy alone, establishing LT as a legitimate therapeutic strategy [6]. Although KRAS mutations (like p.G12V) are linked to poor prognosis, their isolated presence is no longer considered an absolute contraindication.Favorabletumor response, absence of extrahepatic disease, and sustained remission

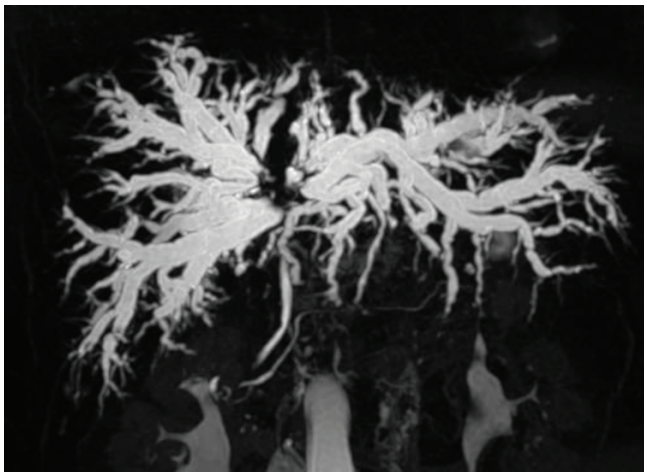

Figure 1: MRI cholangioresonance, the dominant hilar lesion involving the biliary confluence.

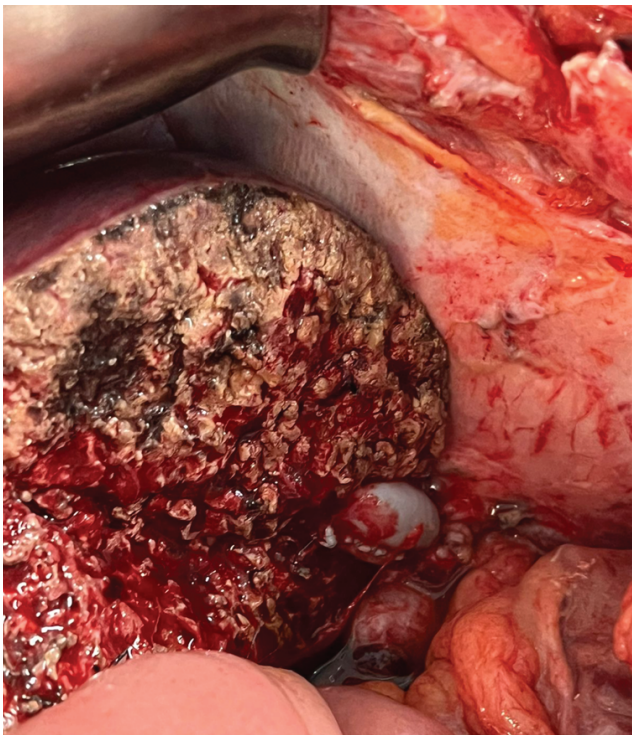

Figure 2: The implant with the reconstruction of the V8 vein to the right hepatic vein using an iliac vein allograft.

under systemic therapy played critical roles in this case.The surgical complexity of LDLT in the oncologic setting deserves mention. Despite postoperative biliary fistula, outcome was favorable. The use of LDLT avoids organ competition and may expand indications safely.This case highlights how transplantation, once considered radical, may provide long-term disease control in highly selected CRLM patients. It supports expanding protocols and prospective trials globally.

4. Conclusion

LDLT can offer a safe and effective treatment for selected patients with unresectable, liver-only CRLM. Proper patient selection, response to chemotherapy, absence of systemic disease, and donor availability are key factors. This case adds to the growing evidence supporting LT as a feasible oncological option, warranting further exploration and protocol development.

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