

rejected when we found a situation of hypovolemic shock secondary to massive hemoperitoneum due to splenic rupture, and conservative surgery of the spleen was ruled out intraoperatively because it was completely unstructured (Moore grade IV).

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Conversion to Segment 4-1 ALPPS Associated With Right Bile Duct Section and External Tube for the Control of Progression Through the Bile Duct of Colorectal Metastases[☆]



Conversión a ALPPS segmento 4-1 con sección de vía biliar derecha y drenaje externo como técnica de control de progresión tumoral biliar de metástasis colorrectal

Surgical resection continues to be the best treatment option for colorectal cancer liver metastases. In cases with bilobar metastases, the residual liver volume (RLV) is usually a limiting factor. Portal vein ligation or embolization makes the necessary RLV attainable in 3-4 weeks.¹ With the ALPPS technique and its variations, important hypertrophy can be achieved in one week. However, it is not always functional, and the reported morbidity and mortality rates, although variable, are high, while the long-term oncological results are unknown.²⁻⁵

We present the case of a 59-year-old patient with no prior history of interest who had been diagnosed 6 years earlier with a moderately differentiated adenocarcinoma in the descending colon (pT3N2M0, mutated k-ras). She was treated with left hemicolectomy and 12 cycles of adjuvant FOLFOX at a referral hospital. Three years later, 2 hepatic metastases were detected in segments 2 and 7, which were treated with left lateral sectionectomy and radiofrequency ablation in segment 7. The patient was administered 12 cycles of perioperative FOLFIRI-bevacizumab. Two years later, hepatic recurrence

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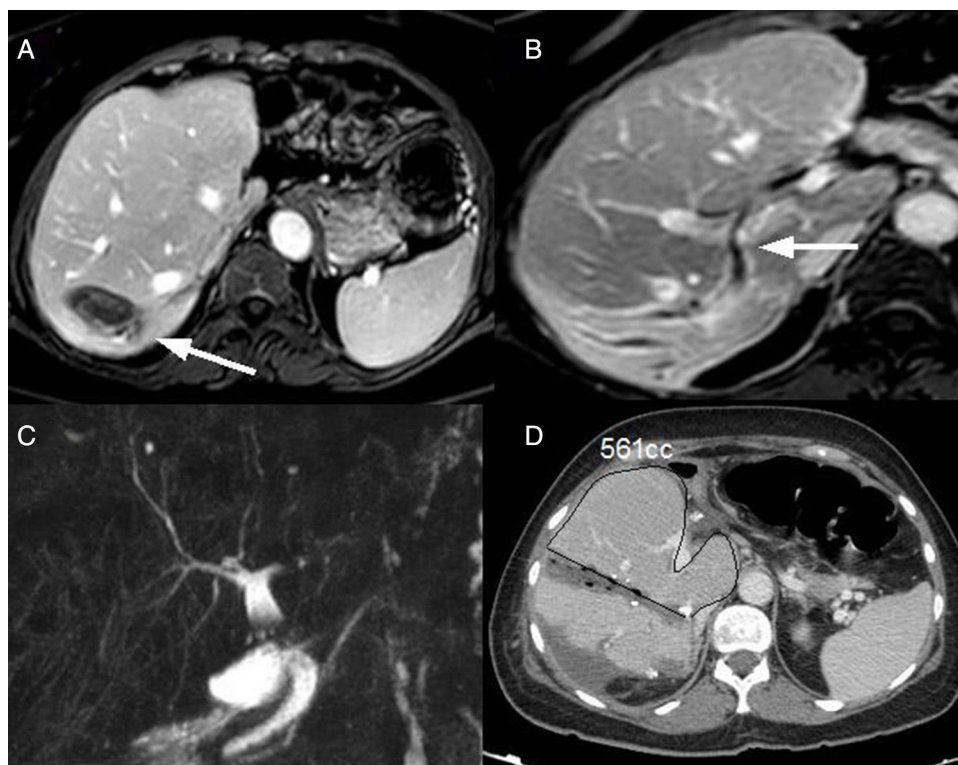


Fig. 1 – (A) Metastasis in segment 7; (B) infiltration of the right posterior bile duct (arrow indicating infiltration limit 21 mm from the anterior duct); (C) MRCP with no dilatation or stenosis; (D) volume CT on the 7th day post-op after the first stage

was detected in segment 7 with extension to the bile duct of this segment as well as the right posterior bile duct. After receiving 3 cycles of FOLFIRINOX-bevacizumab, the patient was referred to our hospital, where we completed the study with magnetic resonance cholangiopancreatography (MRCP) and volumetric imaging. MRI showed a 5 cm tumor in segment 7, which infiltrated and progressed along the right posterior bile duct, without reaching the anterior duct (Fig. 1A–C). Volumetric imaging showed a 23% RLV (316cc) for right hepatectomy and 80% (1099cc) for right posterior sectionectomy. We planned a resection using right posterior sectionectomy, with intraoperative biopsy of the biliary margin. If microscopic infiltration were detected, we would proceed with right portal ligation and right hepatectomy in a second phase. We currently prefer a 2-stage surgery with portal ligation or embolization until the ALPPS technique and results become more standardized.

After performing right subcostal laparotomy, we found a mass measuring 5 cm in segment 7 and absence of segments 2 and 3. Intraoperative ultrasound showed tumor progression through the right posterior bile duct, and the anterior duct was normal. We performed right posterior sectionectomy. After parenchymal division with hilar clamping for 14 min, we divided the portal triad of this sector at the confluence with the right anterior sector, finding that there was macroscopic infiltration in this area. Choledocoscopy ruled out infiltration of the biliary confluence and right hepatic duct. In this situation, we decided to conduct a 2-stage right hepatectomy inwith the ALPPS technique of segments 4-1,⁶ dividing the right bile duct

and placing 2 external biliary drains. We performed the parenchymal dissection following the Cantlie line up to the vena cava, with no hilar clamping. We proceeded with ligation and dissection of the right portal vein and identification of the artery with a vessel loop (Fig. 2A). After dividing the right hepatic duct, we placed a drain tube in each visualized duct; these were affixed with a purse-string suture to the bile ducts to achieve watertightness (Fig. 2B). Intraoperative biopsy of the margin of the right bile duct specimen was identified as malignant. We left 2 subhepatic and subphrenic suction drains and TachoSil[®] patches on the liver surface.

The postoperative patient progress was satisfactory with functioning biliary drains as soon as the patient left the operating room. We administered somatostatin in perfusion from the ligation of the portal vein until the 7th day post-op. Lab work on day 5 showed: prothrombin 73%; INR 1.2; TB 0.9 mg/dL (MELD = 8). Volumetric study on the 7th day post-op (Fig. 1D) showed hypertrophy of the remaining liver (segments 1 and 4), with an RLV of 41% (561cc, 0.82% of body weight, 77% increase over the initial RLV).

The second stage was performed on the 12th day post-op (following the clinical criteria established by the international registry³ to minimize the risk of postoperative mortality): re-laparotomy, identification and dissection of the right hepatic artery, retrohepatic veins and right suprahepatic vein. Somatostatin was perfused from the ligation of the artery until the 7th day post-op. In the postoperative period, the patient had mild hepatic dysfunction (5th day post-op: prothrombin 54%; INR 1.5; TB: 2.1. mg/dL) that was improving upon discharge on

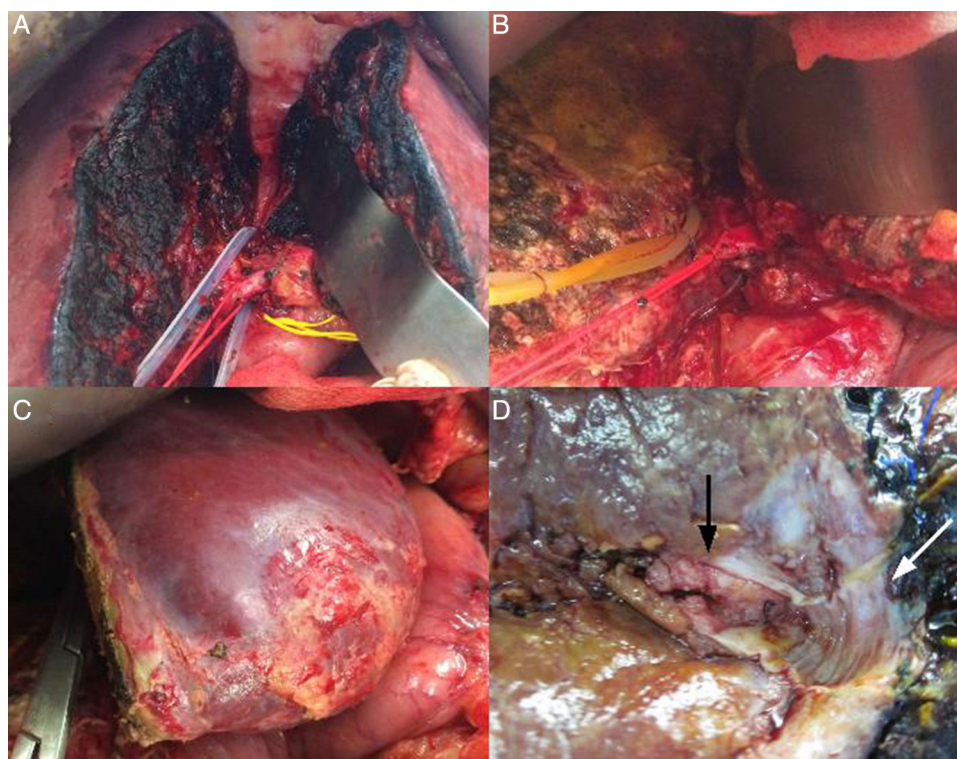


Fig. 2 – (A) 1st stage: partition of the liver along the Cantlie line; vessel loop on the artery; (B) 2nd stage: external biliary drains; (C) liver remnant; (D) resection specimen: black arrow indicating the tumor in the bile duct, white arrow indicating bile resection margin.

the 15th day post-op (prothrombin 63%; INR 1.3, BT 1.6). The pathological study showed no tumor in the margins of the bile duct section (Fig. 2D).

Progression of colorectal metastasis through the biliary tract has already been described by other authors.^{7,8} Infiltration of the main biliary tract worsens prognosis and, in this case, could impede R0 resection. The presence of a macroscopic tumor made us fear that in 3–4 weeks the common hepatic duct would be infiltrated. We needed to achieve hypertrophy of segments 1 and 4 as soon as possible, while at the same time slowing the progression of the tumor through the bile duct. Recently, a series of cases of monosegment ALPPS hepatectomy (including 3 cases of segment 1-4 ALPPS) has been published with good results.⁹ We added the technical variation of dissection and external drainage of the bile duct, which prevented tumor progression during the interval until the second procedure, a method which has not been previously described. Regardless of the criticism or controversy that the ALPPS technique may raise, there is no doubt that in some cases it can be a useful resource.

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