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Case Report

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The Aorta-Hepatic Artery Bypass for Salvage Hepatic Revascularization After Hepato-Pancreatectomy

Mustafa ÖZSOY[1], **İbrahim KILINÇ**[2]

[1] Ankara Yıldırım Beyazıt University Faculty of Medicine, Department of General Surgery, Ankara, Turkey
[2] Ankara City Hospital, Clinic of General Surgery, Ankara, Turkey

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ABSTRACT

In Klatskin tumors, which are radiotherapy and chemotherapy resistant, the only treatment of choice prolonging life is surgery. Surgical principle is complete R0 resection including lymph nodes, associated liver segments and caudate lobe obtaining all negative-margin biliary tracts. A 65-year-old male patient presented with obstruction icterus. On imaging modalities, apart from a mass causing biliary obstruction extending to left main biliary duct, satellitosis nodules were also detected within the left lobe. Surgery was decided after having completed perioperative preparations for the patient in whom distant organ metastasis was not observed. Upon not detecting peritoneal diseases following laparoscopic exploration, it was shifted to the conventional method. The distal margin was sent to Frozen investigation following the disconnection of the coledochus after connecting the left hepatic artery and portal vein. Samples from the proximal biliary tract were also sent for Frozen investigation following left hepatectomy. Since distal margin was not positive when the proximal margin was clean, pancreaticoduodenectomy was also added. Hepatic artery exploration was decided upon not detecting color change in liver, palpation in the hepatic artery and flow on Doppler USG after the resection. During exploration, hepatic artery thrombosis was found secondary to hepatic artery dissection. Due to the fact that other hepatic artery reconstructions techniques were not probable, it was decided not to perform hepatic artery reconstruction in the form of aortahepatic bypass with a 6-mm Gore-Tex graft. The patient is being followed uneventful in his 14th month. Since hepatic artery reconstructions in hepatobiliary malignancies require microsurgical procedures and have high mortality rates, they are among the top controversial topics among surgeons. Aortahepatic bypass with synthetic Gore-Tex vascular graft should be kept in mind for both application ease and not requiring additional dissection.

Keywords: Extended hepatectomy, hilar cholangiocarcinom, pancreaticoduodenectomy, acute liver failure, aorta-hepatic artery bypass

ÖZ

Hepato-Pankreatektomi Sonrası Hepatik Revaskülarizasyon Kurtarma için Aorta-Hepatik Arter Bypass

Radyo ve kemorezistan olan klastkin tümörlerinde yaşam süresini uzan tek tedavi seçeneği cerrahidir. Cerrahi prensip marjin negatif safra yollarını elde edilecek şekilde lenf nodlarının, ilişkili karaciğer segmentlerinin ve kaudat lobun dahil edildiği komplet R0 rezeksiyondur. Altmış beş yaşında erkek hasta tıkanma ikteri tablosunda başvurdu. Görüntüleme yöntemlerinde sol ana safra kanalına uzanan biliyer obstrüksiyona neden olmuş kitlenin yanı sıra sol lob içerisinde satellit nodüller saptandı. Uzak organ metastazına rastlanmayan olguda perioperatif hazırlıkların tamamlanmasından sonra cerrahiye karar verildi. Laparoskopik eksplorasyon sonrasında peritoneal hastalık saptanmaması üzerine konvansiyonel yönteme geçildi. Sol hepatik arter ve portal ven bağlandıktan sonra koledok kesilerek distal sınır frozen incelemeye gönderildi. Sol hepatektomi sonrasında proksimal safra yollarından da frozen gönderildi. Proksimal sınır temizken distal sınır pozitif olması nedeniyle olguya pankreatikoduodenektomi eklendi. Rezeksiyon sonrasında karaciğerde renk değişikliği, hepatik arterde palpasyon ve Doppler USG'de akım saptanmaması üzerine hepatik arter eksplorasyonuna karar verildi. Eksplorasyonda hepatik arter disseksiyonuna sekonder hepatik arter trombozu saptandı. Diğer hepatik arter rekonstrüksiyon tekniklerinin imkanı olmaması nedeniyle hepatik arter rekonstrüksiyonun 6 mm'lik Gore-Tex greft ile aorta-hepatik bypass şeklinde yapılmamasına karar verildi. Hasta takibinin 14. ayında sorunsuz takip edilmektedir. Hepatobiliyer malignitelerde hepatik arter rekonstrüksiyonları mikrocerrahi işlem gerektirmesi ve yüksek mortalite oranları nedeniyle cerrahlar arasında tartışmalı konular içerisinde üst sıralardadır. Hepatik arter rekonstrüksiyon tekniklerinin imkanı olmadığı tüm hepatobiliyer cerrahi işlemlerinde takdirde sentetik Gore-Tex damar greft ile aorta-hepatik bypass gerek uygulama kolaylığı gerekse ek disseksiyona ihtiyacı duyulmaması nedeniyle akılda bulundurulmalıdır.

Anahtar Kelimeler: Genişletilmiş hepatektomi, hilus karsinomu, pankreatikoduodenektomi, akut karaciğer yetmezliği, aorta-hepatik arter bypass

Corresponding Address

Mustafa ÖZSOY

Ankara Yıldırım Beyazıt University
Faculty of Medicine,
Department of General Surgery,
ANKARA-TURKEY
e-mail: dr.mustafaozsoy@gmail.com

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INTRODUCTION

In Klatskin tumors, which are radiotherapy and chemotherapy resistant, the only treatment of choice prolonging life is surgery. Main treatment approach is comprised of hepatectomy to obtain negative surgical margins and major abdominal surgery including pancreaticoduodenectomies, as well (2). In this paper, it was aimed to present our hepatic artery reconstruction technique following the dissection that developed in the right hepatic artery intraoperatively in a patient who underwent advanced resection for Klatskin tumor.

CASE REPORT

A 65-year-old male patient presented with jaundice, itchiness, weight loss and pain on the upper right quadrant. Laboratory findings were consistent with obstruction icterus. On imaging methods of the patient whose CA 19-9 level was over 10.000 U/ml, it was seen that there was cholangiocarcinoma with satellitosis nodules within the left lobe, which caused obstruction on the biliary duct. External biliary drainage catheter was placed in the case in whom distant organ metastasis was not detected on PET/CT. Surgery was decided upon seeing that total bilirubin level fell to 3.0 mg/dl and remnant lobe volume was sufficient. Since there was no peritoneal spread in laparoscopic exploration, it was shifted to conventional surgery. Left portal vein and left hepatic artery were attached and cut. Coledochus was disconnected revolving the supraduodenal region. Frozen was sent from the distal end. Following the completion of celiac lymphatic gland dissection and without applying vascular clamping, left hepatectomy was performed with the pens crush maneuver with clips and clamping, when deemed necessary. Frozen was sent from proximal biliary tracts. While proximal end surgical margin was found clean on Frozen, tumor was observed to continue at the distal end. The patient was decided on to undergo pancreaticoduodenectomy. Intraoperative Doppler USG was performed upon not detecting color change in the liver and palpation in the hepatic artery. Hepatic artery was opened at the site where the gastroduodenal artery is attached since intrahepatic arteria blood flow was not detected on Doppler USG. It was observed that thrombus secondary to intimal dissection occurred in the hepatic artery. It was detected to extend to the margin of the right hepatic artery distally and to the margin of the splenic artery proximally. Aortahepatic bypass was performed with a 6-mm Gore-Tex graft that started anteriorly of the aorta to the level of right hepatic artery bifurcation placing an infrarenal aortic clamp (Figure 1). The surgery was terminated by completing the reconstructions upon detecting arterial flow within the liver on Doppler USG (Figure 2). The patient was discharged on postoperative 15th day without major postoperative complications. The patient, who was started on

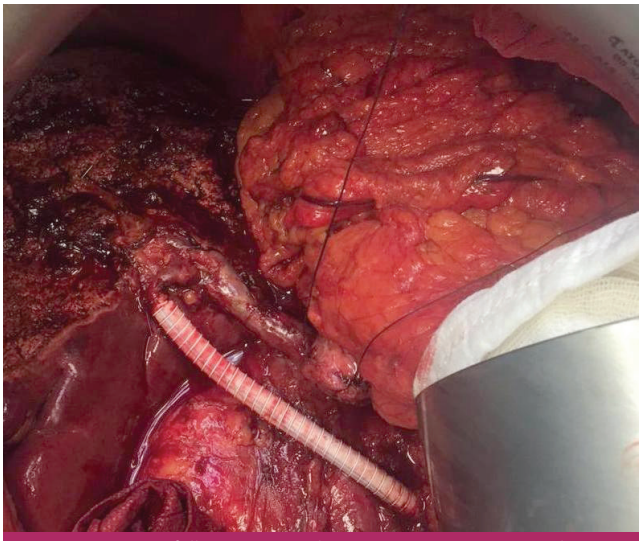

Figure 1. Image following aorta-hepatic reconstruction with Gore-Tex graft after hepatopancreatic-duodenectomy.

Figure 2. Macroscopic image of hepatopancreatic+duodenectomy specimen.

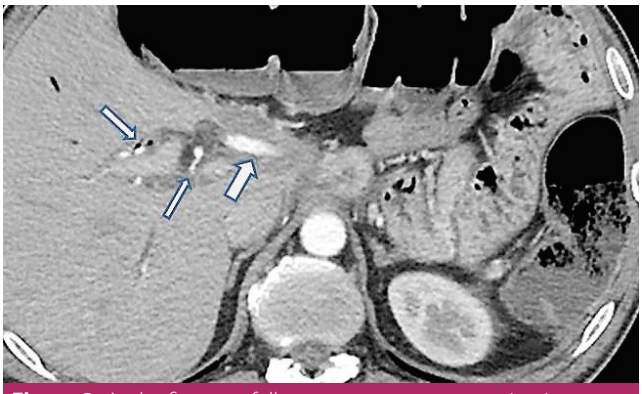

Figure 3. At the first-year follow-up, artery reconstruction is seen to be in pattern.

adjuvant therapy, is being followed without recurrences or metastases in the 14th month follow-up (Figure 3).

DISCUSSION

Life span of cholangiocarcinoma cases in whom complete resection cannot be done is rarely longer than six months (3). The most important prognostic criterion affecting the length of survival after surgery is the presence of lymph nodes (4). In the study by Kayahara, while 5-year survival is 21% in cases with lymph node involvement, this rate rises to 65% in cases without lymph node involvement (5). Portal vein resection in Klatskin tumors is routinely performed in advanced hepatobiliary centers. However, authors still debate on the effect of hepatic artery resection on survival. Hepatic artery resection series of Madariaga, Lee, Hemming, and Hidalgo are case studies (6-9). They are frequently less than five cases, and their surveillance investigations are not thorough. In a 9-case series by Gerhards, mortality has been reported at a rate as high as 55.6% (10). While reconstruction after hepatic artery resection is frequently done end-to-end, saphena, and gastroduodenal and gastroepiploic or synthetic vascular grafts are used as interposition grafts. The most feared complication following hepatic artery resection is thrombus. In radical hepatobiliary surgery, possible hepatic artery thrombus due to the disconnection of many collaterals and peribiliary artery networks secondary to the ischemia of the hepatoduodenal ligament may result in fatal liver necrosis. Oxygen capacity of the portal vein is not sufficient enough to protect from liver ischemia. Therefore, portal vein arterialization (PVA) is a life-saving technique when hepatic artery reconstruction is not possible (15,16). In experimental studies, increased oxygen amount in the portal system following major hepatobiliary surgery has been reported sufficient for liver regeneration. In a study by Qiu, reconstruction could not be possible in 4 patients after arterial resection, and the remnant liver was fed with PVA (17). Moreover, portal vein arterialization is easier than microvascular anastomosis in terms of surgical technique. However, PVA is not an innocent technique. Its most vital complication is portal hypertension. Portal hypertension has developed in one patient out of four in Qiu's study and two patients out of six in the series by Iseki et al. (17,18). The most important risk factor in the development of portal hypertension is the diameter of anastomosis. Although its treatment is difficult, it can be treated by embolization through an interventional method of the hepatic artery. However, the risk of acute liver failure remains if sufficient arterial collaterals are not developed after embolization.

Our case was operated on following the diagnosis of type 3 hilar cholangiocarcinoma after the completion of his preoperative tests. Since distal margin was not positive when the proximal margin was clean, pancreaticoduodenectomy was also added into the operation. Hepatic artery exploration was decided upon not detecting color change in liver, palpation in the hepatic artery and flow on Doppler USG after the resection. Gastroduodenal artery node line was opened. Intimal dissection and thrombus secondary to the dissection were observed to have developed in the hepatic artery. Following thrombectomy, the dissection was detected to have progressed until the splenic intersection proximally and right hepatic artery bifurcation distally. Since pancreaticoduodenectomy was also performed on our patient, it was not possible to conduct porto-arterization for liver vascularization. Due to the fact that the dissection extended to the celiac artery root, aortahepatic bypass with Gore-Tex synthetic vascular graft was decided for reconstruction purposes. A 6-mm synthetic vascular graft was chosen for reconstruction.

To conclude, major hepatopancreaticobiliary surgeries involving the simultaneous resection and reconstruction of the portal vein and hepatic artery are associated with both technical difficulties and prolonged operative time and increased blood loss. However, they can be performed with acceptable morbidity and mortality rates in the hands of experienced hepatobiliary surgeons. In all hepatobiliary surgical procedures requiring hepatic artery reconstruction, aortahepatic bypass with synthetic Gore-Tex vascular graft should be kept in mind for both application ease and not requiring additional dissection.

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