Symposium 6

Preoperative Management for Small Remnant Liver Following Major Hepatectomy for Hilar Cholangiocarcinoma

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In the treatment of hilar cholangiocarcinoma, correct diagnosis and curative surgical resection with appropriate preoperative preparation are the most important to achieve a good outcome. Correct diagnosis includes histologic diagnosis, assessment of tumor extent according to Bismuth classification, tumor staging with nodal and distant metastasis, and whether the tumor encased to hepatic artery and/or portal vein. If it is assessed as curative surgical resection, careful preoperative preparation strategy is very important. In order to reach curative goal, extensive hepatic resection, usually extended right hepatectomy with caudate lobectomy, is mandatory. Preoperative biliary drainage is next step to revitalize the cholestatic liver, the serum bilirubin level down to below 2 mg/dl. Hepatic reservoir function including appropriate remnant volume is crucial for safe recovery of the patient after extensive hepatic resection. One of the important tests to assess the hepatic reservoir is indocyanine green excretion test, which is reliable when the serum bilirubin level is <2 mg/dl, because it is measured by photospectrometry. Next step is calculation of future remnant liver (FRL) volume after surgical resection based on the high resolution multidetector CT scan. It has been recommended that the FRL versus total liver volume is >30% for major resection. Preoperative portal vein embolization (PVE) should be considered in patients when an insufficient future liver remnant is expected.

When Do We Need Portal Vein Embolization?

PVE is considered when the FRL is found to be too small for sufficient postoperative function. In normal parenchyma as is usually the case in patients with liver metastasis, the minimum volume of FRL may be 25% based on CT volumetric studies to avoid postoperative liver failure. PVE is more advantageous in patients requiring extended liver resection of in patients with diseased livers.1 As long as the true minimum volume of liver required for safe resection in a normal liver is debatable, the indication for performing PVE in normal livers remains controversial. If the FRL is less than 30% in normal liver, PVE is recommended usually. Then, for the hilar cholangiocarcinoma, most of the patient has cholestatic liver, a little bit deranged liver function. Surgical resection is performed while the bilirubin level is going down to normal, therefore the liver function may not be recovered completely until surgery day. Therefore, PVE absolutely beneficial for the extended right hepatectomy of the hilar cholangiocarcinoma in cases of insufficient FRL are expected.

Advantage and Disadvantage or Complication of Portal Vein Embolization

In prospective clinical trial from the group of Beaujon Hospital in Paris, patients undergoing standard right hemihepatectomy were randomized to receive preoperative PVE or not. In patients with normal liver, the hypertrophy rate of the functional remnant liver induced by PVE was 16%, however, in patients with chronic liver disease it was 9%. Although the rate of hypertrophy was low in the patient with chronic liver disease, the rate of postoperative complication was significantly reduced in PVE group in comparison to the patients with normal liver.[1] In the retrospective cohort study of the PVE prior to right extended hemihepatectomy for hilar cholangiocarcinoma, the median increase of future remnant liver was 7.3%.[2] There was no critical complication in both

studies. Although PVE is considered as safe procedure, a meta-analysis of 1088 patients who had successfully undergone PVE showed an overall morbidity rate of 2.2%, however, with no mortality. Complications reported due to the procedure are hematoma, hemobilia, septic complications, backflow of embolization material and thrombosis of the main portal vein or branches of the portal venous system to the liver segments to be preserved.[3]

Portal Vein Embolization vs. Combined Hepatic Vein or Arterial Embolization

There are two interesting trials to induce hypertrophy of the future liver remnant. In a prospective randomized study of arterial versus portal venous embolization for induction of hepatic hypertrophy in hilar cholangiocarcinomas, as we can expect, significantly greater hypertrophy and less complications including hepatic abscess in PVE group than hepatic arterial embolization group.[4] In a study of sequential ipsilateral hepatic vein embolization after portal vein embolization to induce further liver regeneration, authors concluded that compared with PVE alone sequential application of PVE and HVE is a little bit more effective and seems to be safe. However, it looks wasteful of time, doctor's energy and medical cost to achieve limited additional increase of future liver remnant with this sophisticated procedure.[5]

Optimal Timing of Portal Vein Embolization and Hepatectomy

Percutaneous biliary drainage before PVE is absolutely important to improve jaundice and cholangitis. Appropriate bilirubin level before PVE is acceptable if it is <5 mg/dl. Tumor progression after PVE creates a dilemma in terms of optimal waiting time until resection. The risk of tumor growth obviously demands an as short as possible waiting time. The non-embolized liver segments grow rapidly during the first 3 weeks after PVE, followed by a plateau phase with only slight additional increase of FRL. Therefore, a period of 3~4 weeks after PVE is considered as appropriate time point to do extended hepatectomy.

In conclusion, PVE is a useful preoperative intervention to increase volume and function of the FRL, when planning extensive liver resection, especially in patients with compromised liver parenchyma or when associated with additional major GI procedures. The hypertrophy response after PVE has predictive value in regard with posthepatectomy outcome.

References

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