Oral Presentation IX

IX-1

The Surgical Impact of the Inferior Right Hepatic Vein in Right Anterior Sectionectomy or Right Posterior Sectionectomy

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Research Purpose: In hepatectomy for hepatocellular carcinoma (HCC), Glissonean pedicle transection method (GPTM) is so important because of tumor biology of HCC. In right anterior sectionectomy (RAS) or right posterior sectionectomy (RPS), GPTM can enables the precise anatomical hepatectomy through demarcation of liver. And in most of cases, RAS or RPS following demarcation after Glissonean pedicle clamp results the exposure of right hepatic vein (RHV), because RHV is anatomical border between right anterior section and right posterior section. However, the existence of inferior right hepatic vein (IRHV) may affects the course of RHV because IRHV drains right inferior part of liver usually. So It may be difficult to exposure of RHV during RAS or RPS. The aim of this study is for the evaluation of the affect of IRHV to the exposure of RHV.

Materials and Methods: From January 2009 to October 2011, 147 patients, 102 men and 45 women, have underwent RAS or RPS for HCC. Every patient underwent hepatectomy using GPTM and was tried to expose RHV as possible for a precise anatomical hepatectomy. We reviewed operative records for the extent of exposure of RHV and the existence of IRHV retrospectively, and measured the size of RHV and IRHV by referring preoperative CT scan.

Results: Of the patients, 90 (61.2%) patients underwent RAS, 57 (38.8%) patients underwent RPS. The size of RHV ranged from 2.2 mm to 15.0 mm with an average of 7.6 mm. The size of IRHV ranged from 1.9 mm to 9.5 mm with an average of 5.0 mm. The extent of exposure of RHV is graded 3 stages, the stage of no exposure was 24 (16.3%) (with IRHV, 18 cases; without IRHV, 6 cases), the stage of half exposure was 33 (22.4%) (with IRHV, 17 cases; without IRHV, 16 cases), the stage of full exposure was 90 (61.2%) (with IRHV, 25 cases; without IRHV, 25 cases). And there was linear correlation between the extent of RHV and the existence of IRHV ($p < 0.001$).

Conclusions: In RAS or RPS, RHV play a role in an accurate anatomical hepatectomy. However, the existence of IRHV affects the drainage of RHV and in consequence affects the extent of exposure of RHV, because IRHV drains mainly right inferior part of liver. Therefore, when we plan RAS or RPS, we must evaluate the existence of IRHV, and consider the anatomical variation of hepatic vein for a precise anatomical resection.

IX-2

Minimally Invasive Liver Resection for Hepatocellular Carcinoma: from Total Laparoscopic Approach to Robotic Approach

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Research Purpose: Laparoscopic liver resection has recently gained popularity for the treatment of hepatocellular carcinoma (HCC), but the limited resection is recommended for the peripheral tumors. The robotic surgery has developed to overcome the limitations of conventional laparoscopic surgery. In this study, we attempted to investigate outcomes of minimally invasive liver resection and to reveal the role of the robotic system for treatment of HCC.

Materials and Methods: From March 2008 to September 2011, 151 consecutive patients underwent curative resection of HCC by a single surgeon at Yonsei University Health System, Korea. Among them, 35 received minimally invasive liver resections, which included total laparoscopic (n=22) and robotic resection (n=13). Clinicopathologic characteristics, perioperative outcomes, complications and disease-free survival were compared between minimally invasive (MI) group and open group. The extent of liver re-

section was compared between total laparoscopic and robotic resection group.

Results: Age, Sex, and underlying liver function were similar between the two groups. Larger and multiple tumors were more frequently observed in open group. The tumors were more frequently located in segments 2 to 6 in MI group (82.9% vs. 53.6%, P=0.001). Although the extent of liver resection (major vs. minor) was not different between the two groups, the average operative time was significantly longer in MI group (362 vs. 267 min, p=0.02). The average amount of blood loss was smaller in MI group (239 vs. 448 ml, $p<0.001$), but the requirement of perioperative transfusion was not different. Postoperative complications were less frequently observed in MI group (25.7% vs. 45.7%, p=0.035) and the mean length of stay in the hospital was significantly shorter in MI group (9.4 vs. 14.7 days, p=0.002). According to the TNM stage, disease-free survival was comparable between the two groups. In MI group, major resection (n=7) was only performed in robotic group (n=7). In robotic resection group, only one patient received non-anatomic resection. There were three conversions to open surgery only in laparoscopic group.

Conclusions: Although operative time was longer in minimally invasive group, minimally invasive liver resection showed improved perioperative outcomes and comparable oncologic results in selected patients. According to the complexity of procedures, the robotic surgery may expand the indication of minimally invasive liver resection in patients with HCC.

IX-3

Segment 6 Preserving Right Lobectomy And Right Hepatic Vein Reconstruction for Huge Right Lobe Hepatocellular Carcinoma in Old Aged and Cirrhotic Patient

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Background: When advanced huge hepatocellular carcinoma involves segment 5, 7 and 8, Rt. lobectomy is usually recommended. However, old aged patient with cirrhotic liver and small volume left lobe can not tolerate for major hepatectomy such as Rt. lobectomy. Under this situation, the patient having initially unresectable huge hepatocellular carcinoma occupying the right lobe (segment 5,7, and 8), we successfully performed segment 6 preserving systematic right hepatectomy with right hepatic vein resection and reconstruction.

Method: The patient was a 71-year-old male having cirrhotic liver. He presented with a huge hepatocellular carcinoma located at segment 5, 7 and 8. Indocyanine green 15 minutes retension rate was 27.943%. For segment 6 preserving right lobectomy with right hepatic venous resection and reconstruction, right anterior, posterior and left hepatic Glisson pedicles are isolated after laparotomy. The extent of hepatectomy was decided by clamping of right anterior Glisson pedicle and demarcation between segment 6 and 7 under guidance of intraoperative ultrasonography. Hepatectomy was performed by Kelley crushing method using intermittent Pringle maneuver (15 min clamping and 5 min declamping). During hepatectomy, distal right hepatic vein draining segment 6 and right hepatic vein stump were isolated respectively, and then intervening right hepatic vein was resected with segment 5, 7, and 8. After bleeding control of resection surface of the liver, right hepatic vein was reconstructed with fresh iliac vein graft from cadaveric organ donor.

Result: His postoperative coarse was uneventful. Postoperative peak AST/ALT , total bilirubin and prothrombin level were 532/430 (IU/L), 3.0 mg/dl, and 60.0%, respectively. The liver function test has been improved and nearly normalized only a few days after. The patient was recovered uneventfully and discharge on postoperative 23 days.

Conclusions: Right hepatic vein resection and reconstruction combined with segment 6 preserving systematic Rt. lobectomy may selectively offer a chance of curative resection for a patient in whom right lobectomy is unacceptable due to old age, liver cirrhosis and also too small expected remaining left liver volume for huge HCC occupying segment 5, 7 and 8.

IX-4

Anatomical Volume Preserving Rt. Hemihepatectomy for Hepatocellular Carcinoma

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Purpose: In patient with hepatocellular carcinoma (HCC), Hepatectomy is widely accepted as the most effective therapy. Recently, resection of the posterior and dorsal segments (volume preserving Rt. hepatectomy) was proposed instead of Rt. hepatectomy to preserve liver function and reduce risk of liver failure. In this study, we identified surgical outcomes of conventional Rt. hepatectomy and volume preserving Rt.hepatectomy in patient with hepatocellular carcinoma.

Methods: A total of 598 hepatocellular carcinoma patients receiving surgical resection between January 2007 and December 2010 were analyzed retrospectively. 150 patients underwent Rt. hepatectomy was included in this study. Patients were classified into two groups according to resection scale: conventional Rt. hepatectomy group and volume preserving Rt. hepatectomy group. Patients and tumor characteristics, operative details, postoperative complications were analyzed.

Result: Conventional Rt. hepatectomy was performed in 133 of 152 patients. Volume preserving Rt. hepatectomy in 27 of 152 patients. Volume preserving Rt. hepatectomy have 57.32% remnant liver volume instead of 29% Lt. lobe volume. Patients' characteristics (age, sex), preoperative MELD score and CTP score, T stage, intraoperative bleeding did not differ between conventional Rt. hepatectomy group and volume preserving Rt. hepatectomy group. Complication rate was not different in two group (p=0.62). The operation time was longer in the volume preserving Rt. hepatectomy group ($p<0.032$). The distance between tumor and resection margin was longer in the conventional Rt. hepatectomy group (conventional Rt. hepatectomy group: 2.84cm, volume preserving Rt. hepatectomy group: 1.92cm, $P<0.01$). But, The rate of case that distance was less than 1cm was not different in two group (p=0.61). MELD score of 5 days, 6 months and 1 year after operation was not different in two group. (p=0.12, 0.38, 0.74). But, in conventional Rt. hepatectomy group, 4 patient expired because of liver failure without recurrence and adjuvant therapy, compared with no expire in volume preserving Rt. hepatectomy group. Overall survival and disease free survival rate was not differ between conventional Rt. hepatectomy group and volume preserving Rt. hepatectomy group. (3-year disease free survival rate, 72.7% vs 60.8%, p=0.37; 3-year overall survival rate, 85.5% vs 90.9%, p=0.19).

Conclusions: Volume preserving Rt. hepatectomy allow both systematic liver resections and preservation of liver volume. In long term follow up, oncological safety and liver function was not differ from Rt. hepatectomy. volume preserving Rt. hepatectomy is alternative method in patient required limited hepatic resection.

IX-5

Clinical Outcome of Intraoperative Radiofrequency Ablation for Hepatocellular Carcinoma in the Cases of Difficult for Resection

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Introduction: The purpose of this study is to analyze the outcome of intraoperative radiofrequency ablation (RFA) for hepatocellular carcinoma (HCC) in cases of difficult for resection.

Methods: Two hundred and thirty five patients underwent curative surgery for HCC in our institution. Two hundred and eleven patents underwent curative hepatic resection only (resection group). The remaining twenty four patients underwent intraoperative RFA with (n=17) or without (n=7) hepatic resection (RFA group). RFA was performed in limited cases for unresectable cases including bilobar multiple diseases, poor hepatic reserve function. Clinical data and out-

comes were analyzed and compared between the two groups retrospectively.

Results: Postoperative complication rates were not different statistically between the two groups (25% in RFA group and 36% in resection group, p=0.20). There was no hospital mortality in RFA group. Five-year survival rates are not statistically different in the two grous (8.3% in RFA group, and 14.2% in resection group, p=0.300). In the subgroup analysis with multiple tumors, 5-year recurrence free survival rates were not statistically different (5.9% in RFA group, and 4.3% in resection group, p=0.059).

Conclusions: Intraoperative RFA is safe and effective treatment option in selected patients with bilobar multiple HCCs or poor hepatic reserve function.

IX-6

The Clinical Feasibility of Inferior Right Hepatic Vein-preserving Right Hepatecotmy

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Research Purpose: The presence of hypertrophic inferior right hepatic vein enable to preserve the posteroinferior segment of the right lobe. This study aimed to clarify the clinical feasibility and introduce our techniques of S6-preserving hepatectomy with preservation of inferior right hepatic vein.

Material and Methods: Between January 2008 and December 2011, 4 patients underwent S6-preserving right hepatectomy. Postoperative outcomes and interim results were evaluated.

Results: Two patients had liver metastasis from rectal cancer, one patient had cholangiocellular carcinoma, and the other had hepatocellular carcinoma. The ratio of estimated volume of the left lobe to the total estimated liver volume was 21.1-24.2%. When the segment 6 was preserved, the remnant volume was 38.0-47.5%. The median total operating time and blood loss were 284 (range, 220-416) min and 450 (range, 300-1,700) ml. One patient received intraoperative transfusion. All patients had negative surgical margin. No patient had signs of postoperative liver failure, but one patient developed postoperative complication (bile leakage), which was managed by conservative treatment. The median hospital stay was 14.5 days (range, 14-50) and the median follow-up was 32 (range, 2-66) months. One patient who had liver metastasis from rectal cancer died on the postoperative 11 months due to the progression of the disease. The others were alive at the last follow-up.

Conclusions: Inferior right hepatic vein-preserving hepatecotmy is safe and feasible procedure according to our experience. This technique can be the option for curative resection minimizing postoperative deterioration of liver function without preoperative portal vein embolization in patients with a reliable inferior right hepatic vein.