
KAHBPS-PP-1-1

Outcomes and recurrence patterns after non anatomic liver resection for solitary HCC

Department of Surgery, Kyungpook National University, School of Medicine, Korea

**Jae Min Chun, Hyung Jun Kwon,
Young Seok Han, Sang Geol Kim,
Yoon Jin Hwang***

(Purpose) Patient survival after limited non-anatomic resection for hepatocellular carcinoma remains controversial. **(Methods)** Among 184 patients who underwent surgical resection for hepatocellular carcinoma from March 2009 to February 2012, 79 patients who primarily treated for single tumor without gross vascular invasion was enrolled in this study. These patients were divide into two groups based on the extent of resection: anatomic (n=31) vs. nonanatomic resection (n=48), and we compared the clinical characteristics, overall survival, disease free survival and recurrence patterns of these two groups **(Results)** The 1 year/3 year disease free survival, after anatomic resection, was 83.7%/63.3% and 85.2%/64.7% after nonanatomic resection. ($P=0.94$) Also, no differences were observed in overall survival rates between two groups. ($P=0.49$). Among 18 patients who had recurrence after nonanatomic resection, 8 patients had tumors in same hemiliver with primary lesion. **(Conclusion)** In patients with solitary hepatocellular carcinoma, without gross vascular invasion, nonanatomic liver resection can be efficient treatment.

KAHBPS-PP-1-2

Hepatic portal venous gas from mesenteric infarction with pneumatosis intestinalis

¹Division of Transplant and Vascular Surgery, Department of Surgery, ²Division of Hepatobiliary and Pancreas Surgery, Department of Surgery, Korea University College of Medicine, Korea

**Pyoung-Jae Park¹, Wan Bae Kim²,
Sae Byeol Choi², Sang Yong Choi^{2*}**

(Purpose) Introduction Pneumatosis intestinalis (PI) is associated with various disease, such as mesenteric infarcton, necrotizing enteritis, Crohn's disease, obstructive pulmonary disease or blunt trauma etc. Hepatic portal venous gas (HPVG) is usually identified when bowel necrosis is developed. HPVG is a comparatively typically located in the peripheral regions of the liver while pneumobilia generally manifests as air centrally located within the liver. We reported a case of HPVG from mesenteric infarction with pneumatosis intestinalis. **(Methods)** A 65-year-old female patient was admitted to emergency room because she collapsed in the street. She had undergone low anterior resection with loop ileostomy due to rectal cancer 1 months ago. At admission, vital sign was significant unstable and WBC count was 33,800/uL. Septic shock was suspected. BUN/creatinine level was increased to 117.9mg/dL/2.23mg/dL and so non-enhance CT was taken. PI of small bowel and diffuse air containing lesions of liver were identified. Medical doctors made a wrong diagnosis that air lesions were pneumobilia and cholangitis and so fluid resuscitation and antibiotics management were started. But an experienced surgeon made a re-diagnosis that air lesions were HPVG due to mesenteric infarction with PI. Emergent exploratory laparotomy was performed. 1m length multifocal lesions of small bowel was severe infarcted. Segmemal re-

section and end to end anastomosis with ileostomy revision were performed. After ICU care during postoperative 7 days, she was rehabilitated at the general ward and recovered. She was discharged at the postoperative 25 days. **(Results)** HPVG was located in the periphery of the liver (predominant left liver) and any air in extrahepatic bile ducts was not found. **(Conclusion)** HPVG was considered as being an indicator of bad prognosis and as being associated with a particularly high mortality rate. Therefore, HPVG should be exactly diagnosed without confusion of pneumobilia.



Fig 1. Hepatic portal venous gas

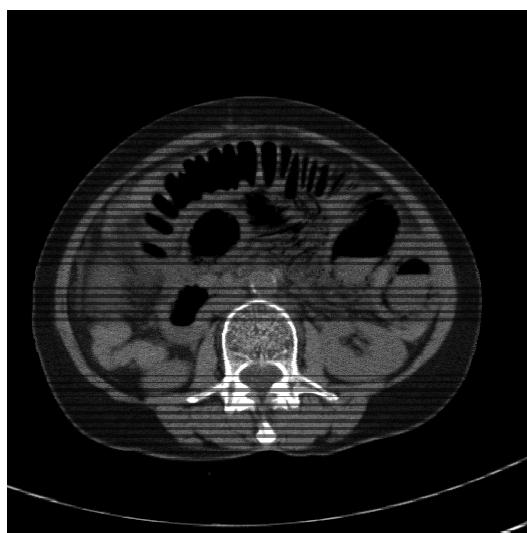


Fig. 2. Peumatosis intestinalis

KAHBPS-PP-1-3

Surgical resection for hepatic angiomyolipoma accompanying necrosis and hemorrhage

Department of Surgery, Konyang University Hospital, Korea

Jung Suk Lee, Jun Suk Byun, In Seok Choi*,
Ju Ik Moon, Yu Mi Ra, Sang Eok Lee,
Won Jun Choi

(Purpose) Angiomyolipoma (AML) is a benign mesenchymal tumor that is frequently found in the kidney and, rarely, in the liver. Sometimes AML has been overdiagnosed as hepatocellular carcinoma, hepatic adenoma, or angiosarcoma. We report a case of hepatic angiomyolipoma with necrosis and hemorrhage that was successfully resected. **(Methods)** A 59-year-old female patient was accidentally detected a hepatic tumor in left lateral segment, which revealed a well-defined mass of mixed echogenicity, 9.2 cm in diameter and the biopsy was revealed angiomyolipoma (AML) 9 years ago. She admitted with epigastric pain, fever, and general myalgia, and on computed tomography, the tumor has grown to 15 cm in size and included tumoral cystic change, hemorrhage, and necrosis. **(Results)** We performed laparoscopic assisted left hemihepatectomy. The operation time was 4 hour 30 minutes and blood loss was 250 ml. The patient started a diet POD 3 day and discharged POD 8days. The histopathological diagnose of the resected specimen was angiomyolipoma which consisted of mature lipocytes with angiomaticus and small lymphocytic components, but no mitotic figures. The postoperative course was uneventful, and the patient was discharged without any complications. **(Conclusion)** Even though hepatic AML shows no propensity for metastases or malignant potential, hepatic AML with necrosis and hemorrhage should be treated with complete surgical resection.

KAHBPS-PP-1-4

The difference of clinical outcomes as the change of management for recurrent hepatocellular carcinoma after initial treatment with hepatic resection

Department of Surgery, Korea Cancer Center Hospital, ¹Department of Surgery, Samsung Medical Center, Sungkyunkwan University School of Medicine, Korea

**Ryounggo Kim, Hyoung-Un Baek,
Sang Bum Kim*, Eung-Ho Cho,
Dong Wook Choi¹, Jin-Ok Kwon, Eun Byul Ko**

(Purpose) With the recent advances in imaging technique such as magnetic resonance imaging (MRI) and local treatments such as radiofrequency ablation (RFA) and surgical resection, the clinical outcomes in hepatocellular carcinoma (HCC) have been changed. We analyzed clinical outcomes of the treatment for recurrent HCC according to the chronological periods. **(Methods)** During 10 years between January 2003 and December 2012, 287 patients with HCC underwent curative hepatic resections at the Korea Cancer Center Hospital. We divided these 287 patients into two groups depending on the era of operation. Group A (n=145) was composed of the patients who underwent hepatic resection during 5 years between 2003 and 2007, and Group B (n=142) was during 5 years between 2008 and 2012. Their clinical data were analyzed retrospectively. **(Results)** The median follow-up period was 76.0 months (range, 1-131 months) in Group A, and 40.5 months (range, 0-80 months) in Group B. Patients' characteristics were similar between two groups except tumor etiology. Hepatitis B related HCC was less frequent in Group B (78.6% : 68.3%, p=0.048), but Non-B or Non-C HCC was more frequent in Group B (15.2% : 24.6%, p=0.044). After 2008, we examined the patients for

the presence of intrahepatic recurrence by additional gadoxetic acid (PrimovistTM) enhanced MRI. Five-year disease-free survival (DFS) rates were 40.6% in Group A and 32.6% in Group B (p=0.205). Five-year overall survival (OS) rates were 61.7% and 75.7%, respectively (p=0.023). Within follow-up periods, 70 patients had intrahepatic recurrence in Group A and 69 patients in Group B. For the first-line treatment about recurred lesions, 53 (75.7%) patients were treated with transcatheter hepatic arterial chemoembolization (TACE), 9 (12.6%) patients with RFA and 2 (2.6%) patients with reoperation in Group A. But in Group B, 42 (60.9%) patients were treated with TACE, 14 (20.2%) patients with RFA and 7 (10.1%) patients with reoperation. In 11 (15.9%) patients among 69 recurred patients in Group B, intrahepatic recurrence was detected by only MRI rather than computed tomography (CT). **(Conclusion)** In the treatment of HCC, advances of imaging technique such as MRI resulted in early and precise detection of recurrence. And in the treatment for recurred lesions after operation, more active local treatments such as RFA and reoperation can improve the survival.

KAHBPS-PP-1-5

Predictors of early regeneration in remnant liver volume after hepatectomy

Departments of Surgery, ¹Pathology and ²Radiology Chonbuk National University Medical School, Korea

**Jae-Do Yang, Sang In Bae,
Woo Sung Moon¹, Ji Soo Song²,
Baik Hwan Cho, Hee Chul Yu***

(Purpose) The aim of this study to investigate whether early liver volume regeneration following hepatectomy and its change are related to clin-

icopathologic factors such as liver fibrosis/cirrhosis, apo A1, prealbumin and body mass index (BMI). **(Methods)** We studied in a series of 61 patients who underwent hepatectomy - Right hemihepatectomy (n=21), left hemihepatectomy (n=16), left lateral sectionectomy (n=9) and Rt postereror sectionectomy (n=15) for living donation (n=3), malignant (n=41) or benign (n=17) liver diseases between October 2012 and September 2014. Preoperative variables [age, sex, BMI, ApoA1, prealbumin] evaluated with preoperative MDCT imaging were investigated as potential predictors of liver regeneration. The liver fibroscan was performed to patients for evaluate to hepatic fibrosis. The future remnant liver volume (FRLV) was preoperatively calculated with a virtual surgical cut. ApoA1 and prealbumin levels were recorded on 1, 5, 7 postoperative day. Liver volumetric measurement which was evaluated with MDCT at a 7, 21 days after surgery, analyzed using Dr.liver. We evaluated postoperative variable such as cirrhotic change pathologically. **(Results)** The correlation of removed liver volume and weight was found significantly high. ($R^2=0.921$, $P<0.01$) The patients who were cirrhotic change of liver pathologically comparsion with no cirrhosis, correlated in liver fibroscan results. (8 ± 3.2 kPa versus 11.8 ± 7.2 kPa, $P<0.0001$) There were no association between ApoA1/prealbumin and liver regeneration rate. ($P>0.05$) but a stepwise multiple regression analysis showed that a smaller FRLV (coefficient -0.19, $P<0.001$). Pathologically, the liver cirrhosis (n=20) was predictors of greater liver regeneration at 7 days ($p=0.04$) but not 21 days ($p=0.25$) after surgery. **(Conclusion)** Predictors of early regeneration in the remnant liver after hepatectomy were a smaller FRLV and greater cirrhotic change, as opposed to apo A1, prealbumin, and BMI. But, a larger patient pool is needed to evaluate these results more accurately.

KAHBPS-PP-1-6

Comparitive study of totally laparoscopic liver resection for hepatocellular carcinoma between anterolateral and posterosuperior lesions

Department of General Surgery, Seoul National University Bundang Hospital, Korea

WooHyung Lee, Ho-Seong Han*,
Yoo-Seok Yoon, Jai Young Cho,
Youngrok Choi, Hong Kyung Shin,
Jae Yool Jang, Hanlim Choi

(Purpose) Laparoscopic liver resection is usually limited to the anterolateral segments of the liver (AL; Segments II, III, V, VI, and the inferior part of IV) compared with posterosuperior segments (PS; Segments I, VII, VIII, and the superior part of IV). We evaluated the feasibility and long term outcome of laparoscopic liver resection including PS segments. **(Methods)** We analyzed retrospectively the clinical data of 230 patients who underwent laparoscopic liver resection for hepatocellular carcinoma from September 2003 to July 2014. Patients were classified into 2 groups according to tumor location: group AL (n=170) and group PS (n=60). **(Results)** There was no mortality, or reoperation. The predominant type of resection was a minor liver resection in group AL, and a major liver resection in group PS ($P=0.038$). The mean operative time in group PS was greater than that in group AL ($P<0.001$). Group PS showed higher median blood loss ($P=0.001$), more frequent intraoperative transfusion ($P=0.002$). There were no differences in the conversion rate ($P=0.306$), rate of curative resection ($P=1.000$), mean hospital stay ($P=0.112$), and rate of complications ($P=0.108$) between the 2 groups. There was no significant difference in 3-year overall survival ($P=0.160$), and disease free survival ($P=0.876$). **(Conclusion)** Laparoscopic liver

resection for hepatocellular carcinoma located in PS is more difficult than in AL, however there was no difference in short and long term outcome. The limitation according to tumor location will be overcome with accumulation of experience and technical improvement.

KAHBPS-PP-1-7

Clinical analysis of recurrent hepatocellular carcinoma after living donor liver transplantation

Department of Surgery, Seoul St. Mary's Hospital, College of Medicine, The Catholic University of Korea, Korea

Gun Hyung Na, Dong Goo Kim*,
Soo Ho Lee, Eun Young Kim, Jun Suh Lee,
Tae Ho Hong, Young Kyoung You

(Purpose) This study aimed to analyze the clinical outcomes and factors influencing the outcomes in the recurrence of hepatocellular carcinoma (HCC) after living donor liver transplantation (LDLT).

(Methods) We retrospectively reviewed 50 patients with HCC recurrence among 285 patients who underwent LDLT for HCC from October 2000 to December 2013 at our transplant center. **(Results)** Most HCC recurrences (n=42) occurred within 2 years, with 33 patients experiencing HCC recurrence within 1 year. 34 patients did not meet the Milan criteria and 24 patients were positive microvascular invasion. The 1-, 2-, and 3-year overall survival after HCC recurrence were 35.3, 17.1, and 12.9%, respectively. In univariate analysis, microvascular invasion ($p=0.048$), Time to recurrence<6 months ($p<0.001$), multiple recurrence ($p<0.001$), brain metastasis at the time of recurrence ($p=0.003$), and palliative treatment for recurrent tumors ($p<0.001$) were significantly associated with poor survival after HCC recurrence. Time to re-

currence<6 months ($p=0.048$) and palliative treatment for recurrent tumors ($p=0.015$) were independent risk factors for poor overall survival after HCC recurrence in multivariate analysis. In palliative treatment group, combination therapy with sirolimus and sorafenib was significantly associated with good overall survival ($p=0.017$). **(Conclusion)** In conclusion, because almost all recurrent cases belonged to the high risk group and recurred within 2 years, the high risk group should undergo close follow-up for early detection and be treated with curative intent as possible.

KAHBPS-PP-1-8

Laparoscopic and open liver resection for hepatocellular carcinoma; A case-control comparative study

Department of Surgery, Keimyung University Dongsan Medical Center, Korea

Keun Soo Ahn, Koo Jeong Kang*,
Yong Hoon Kim, Tae-Seok Kim, Tael Jin Lim

(Purpose) The aim of this study was to compare the perioperative and long-term oncologic outcomes of laparoscopic liver resection (LLR) and open liver resection (OLR) for single hepatocellular carcinoma in case controlled patients groups using propensity score.

(Methods) Between January 2005 and February 2013, 292 patients underwent surgical resection for HCC. Patients of 202 patients who underwent surgical resection for initial treatment for single mass were enrolled. These patients were divided into 2 groups according to the method of operation: Laparo group (patients who underwent LLR) and Open group (patients who underwent OLR). To correct different demographic and clinical factors in two groups, propensity score matching was used at 1:1 ratio and finally, 102 patients were

enrolled in this study, 51 patients in each group. Preoperative characteristics, perioperative results and long term results were retrospectively analyzed based on prospectively recorded database. **(Results)** Preoperative baseline variables were well balanced in both groups. There were no differences of extent of surgery and rate of anatomical resection between two groups. With the exception of shorter post-operative hospital stay in Laparo group than that of Open (8.2 days Vs 12.3 days, P=0.004), there were no significant differences in perioperative, pathological and long-term outcomes. The 5-year overall survival rates were 80.1% in Laparo group and, 85.7% in Open group, respectively (P=0.173). The 5-year disease-free survival rates were 67.8% in Laparo group and 54.8% in Open group, respectively (P=0.519). **(Conclusion)** Laparoscopic liver resection for HCC is safe and long-term oncologic outcomes were comparable to those who underwent open liver resection in selected patients.

KAHBPS-PP-1-9

Long-term outcome of hepatic resection for combined hepatocellular carcinoma and cholangiocarcinoma

Department of Surgery, Asan Medical Center,
University of Ulsan College of Medicine, Korea

**Jong-Woo Lee, Shin Hwang*, Chul-Soo Ahn,
Young-Joo Lee, Ki Hun Kim, Kwang-Min Park,
Sung Gyu Lee**

(Purpose) Combined hepatocellular carcinoma and cholangiocarcinoma (HCC-CC) is known to be a rare form of primary liver cancer. This study intended to evaluate the long-term outcome following surgical treatment for patients with HCC-CC.

(Methods) Between January 2000 and December 2011, 3931 patients underwent primary live re-

section for HCC in our institution. Of them, HCC-CC was pathologically diagnosed in 36 patients (0.9%). Their clinicopathologic data were retrospectively reviewed. **(Results)** Their mean age was 53.8 ± 7.2 years and males were 28 (77.8%). Hepatitis B virus infection was associated in 26 (72.2%). Preoperative AFP level >20 ng/mL and CA19-9 level >37 U/mL were found in 22 of 36 (61.1%) and 10 of 27 (37.0%) patients, respectively. Preoperative treatment was performed in 11 (30.6%). Two patients underwent preoperative portal vein embolization for right hepatectomy. Anatomical and non-anatomical resection were performed in 26 (72.2%) and 10 (27.8%). Major hepatectomy of two or more sections was performed in 13 (63.9%). Single tumor was in 35 (97.2%) and mean tumor size was 5.4 ± 3.1 cm. Perioperative mortality within 3 months occurred in two, each one due to postoperative hepatic failure after partial hepatectomy and right anterior sectionectomy. Disease-free survival rates were 54.3% at 6months, 37.1% at 1 year and 20.0% at 3 years. The most common site of initial recurrence was remnant liver (24 of 27), thus transarterial chemoembolization became the main treatment modality. Overall patient survival rate was 88.6% at 6 months, 74.3% at 1 year, 34.3% at 3 years and 25.7% at 5 years. With propensity score matching, two control groups with typical HCC (n=50) and typical CC (n=50) were selected. Comparison of the survival curves showed that HCC-CC was located at the midway between HCC and CC. **(Conclusion)** Patients with HCC-CC showed a relatively poor survival outcome after curative resection. Early recurrence within the first year was frequent, thus strict recurrence surveillance and active multimodality treatment appear to improve the patient survival.