

Oral Presentation V

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### Outcome of R0 Hepatic Resection for Non-colorectal Liver Metastases

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**Background/Aims:** The liver is a common site of metastases for many solid tumors. Resection of non-colorectal liver metastases is controversial. With a decrease in morbidity and mortality after liver resection in recent years, surgery seems beneficial in selected cases. The aim of this study is to report our experience with R0 resection for non-colorectal liver metastasis and evaluate liver resection as a treatment option for non-colorectal liver metastases.

**Methods:** We reviewed the medical records of 53 patients who underwent R0 liver resection for non-colorectal liver metastases at our hospital from January 1991 through December 2011.

**Results:** Metastatic tumors of the liver originated from the stomach (n=26), breast (n=8), pancreas (n=4), duodenum (n=3), gallbladder (n=2), esophagus (n=2), ovary (n=2), retroperitoneum (n=2), small bowel (n=1), adrenal gland (n=1), bile duct (n=1) and vagina (n=1). Operative morbidity and mortality for liver resection were 20.7% and 3.7% respectively. The median follow up was 16.8 months. The median overall survival time was 30 months and the 5 year disease-free and overall survival were 30% and 57.5%, respectively. On univariate analysis, recurrence-free survival was significantly lower when the disease-free interval from the primary tumor was less than 12 months. Also, overall survival was significantly lower in males and when the disease free interval was less than 24 months. However, on multivariate analysis, there were no independent prognostic factors for recurrence-free and overall survival.

**Conclusions:** Liver resection for liver metastases of non-colorectal primaries can be performed safely and

has survival rates comparable to that of colorectal metastases. It should therefore be considered in selected cases, especially if R0 resection can be achieved.

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### Histopathologic Factors Affecting Tumor Recurrence after Hepatic Resection in Colorectal Liver Metastases

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**Background:** Hepatic resection is a standard method of treatment for liver metastases of colorectal cancer. However, the pathologic factors of metastatic lesions that affect tumor recurrence after hepatic resection are less well defined. The aim of this study was to clarify the characteristics and identify the risk factors for recurrence of the colorectal liver metastases.

**Methods:** From January 2003 to December 2008, 117 patients were underwent hepatic resection for colorectal liver metastases at Seoul National University Hospital, Korea. Patients' demographics, preoperative and the histopathologic characteristics of the primary colorectal and metastatic hepatic lesions were analyzed. Histologic analysis of metastatic lesions contained major differentiation, tumor budding, angio-invasion, histologic dedifferentiation, tumor infiltrating inflammation.

**Results:** Among 117 patients, 73 (62.4%) were male. The mean age at time of hepatic resection was 64.0 years. Median preoperative carcinoembryogenic antigen level was 6.7 ng/ml (range 1-1,660 ng/ml). The majority of the primary tumor stage was T3 (82.0%). Metastases to a regional lymph node were noted in 79 patients (71.2%). The mean number of hepatic tumors was 2 (range 1-8). The mean size of the largest tumor was 2.9 cm in diameter (range 0.3-18.5 cm). The moderate differentiation occupied the most of major differentiation (86.3%). Histologic dedifferentiations were observed in 15 patients (12.8%). Mild to moderate inflammation infiltrating tumor were detected in 8 patients (6.8%). Recurrence appeared in 69 cases.

(58.9%) Recurrence-free survival at 1 year, 2 years and 5 years were 62.4%, 43.6%, 34.3%, respectively. The multivariate analysis showed the mild to moderate inflammation infiltrating tumor ( $p=0.047$ ), presence of histologic dedifferentiation ( $p=0.020$ ) and number of metastases ( $>2$ ) ( $p=0.007$ ) to be independent risk factors for tumor recurrence after hepatic resection in colorectal liver metastases.

**Conclusions:** Histopathologic evaluation of metastatic lesions can provide an estimate the biologic behavior and tumor recurrence in colorectal liver metastases.

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### Unusual and Rare Complications after Liver Resection

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**Purpose:** Major liver resections are performed at many centers with mortality rates of  $<2\%$ . Bleeding, bile leakage, abnormal fluid collection, and pulmonary complications happen not infrequently after hepatectomy. However, unexpected problems can progress organ dysfunction if definite diagnosis or proper treatment are delayed. We described and evaluated rarely developing complications after liver resection.

**Materials and Methods:** More than 2,000 patients underwent liver resection from August 1994 to February 2012 as a single surgeon's experience. Rare complication is defined when frequency of occurring problem is less than 5 cases (0.25%). Laboratory data, image finding, symptoms, therapy and outcome were evaluated retrospectively.

**Results:** Pyloric obstruction was developed in 3 patients. They underwent left hemihepatectomy, and showed gastric stasis due to adhesion between liver resection site and pyloric area. This symptoms were improved after gastroscopy without surgery. Multiple liver infarction was observed in 3 patients at between postoperative 6 and 14 days. During recovery without specific problem, they showed a sudden increase of liver enzyme with multiple ischemic focus without ab-

normal findings of hepatic artery and portal vein on CT imaging. One patient recovered with conservative management. The other patients underwent plasmapheresis, and one presented a wide progression of ischemic lesion and underwent emergency liver transplantation because of hepatic failure. Hemolytic uremic syndrome (HUS) was developed in 3 patients. They showed decrease of hemoglobin and platelet, increase of serum creatinine and oliguria. In one patients, HUS led to renal and hepatic failure due to improper fluid management without appropriate diagnosis. In two patients, bur cells were observed through PB smear. They recovered eventually with plasmapheresis and hemodialysis. Right posterior duct dilatation after right anterior sectionectomy were observed in 3 patients. None of the patients had clinical symptoms and anatomical reasons.

**Conclusions:** We described unusual and rare complications after liver resection. Surgeons keep in mind of importance of preventing for pyloric obstruction. The cause of multile hepatic infarction is still unknown, but early detection and aggressive treatment are important to avoid hepatic failure. Early diagnosis of HUS is also important because delayed management lead to mortality, and plasmapheresis and hemodialysis is useful for recovery. We are trying to find the reason of right posterior duct dilatation, and must have a close look for frequency.

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### Salvage Resection after Localized Concurrent Chemoradiation Therapy for Locally Advanced Hepatocellular Carcinoma

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**Background:** The aim of this study was to evaluate the outcome of salvage resection after concurrent che-

moradiation therapy (CCRT) followed by hepatic arterial infusion chemotherapy (HAIC) in locally advanced hepatocellular carcinoma (HCC) and to identify the prognostic factors for tumor recurrence and survival rate after salvage resection.

**Methods:** From 2005 to 2011, 254 patients received CCRT followed by HAIC with 5-FU and cisplatin for locally advanced HCC with Child A liver cirrhosis at our institution. 26 patients were excluded from the study because of follow-up loss. Forty-one (16.8%) patients underwent salvage resection after CCRT. Prognostic factors for salvage resection group were investigated through the clinicopathological variables and response of CCRT. Responder was defined as downstaging of tumor and/or partial response after completion of CCRT. The response was evaluated by using modified Response Evaluation Criteria In Solid Tumors (mRECIST) criteria.

**Results:** The 1-, 3-, and 5-year overall survival rates after CCRT were 94.4%, 55.1%, and 49.6% in salvage resection group. Among the patients with initially presented under T3 tumors, overall survival rates were significantly higher in salvage resection group than in CCRT-only group ( $p < 0.05$ ). But in initially presented T4 tumors, there were no significant difference in overall survival rates between the salvage resection group and the CCRT-only group ( $p = 0.601$ ). In multivariate analysis, poor prognostic factors for disease-free survival in salvage resection group were non-responder ( $HR = 3.455$ ,  $p = 0.010$ ) and presence of satellite nodule ( $HR = 7.424$ ,  $p = 0.003$ ). Non-responder was the only independent poor prognostic factor for overall survival in salvage resection group. ( $HR = 3.542$ ,  $p = 0.024$ )

**Conclusions:** Salvage resection after CCRT followed by HAIC shows improved overall survival rates in selected patients with locally advanced HCC. The responder of CCRT followed by HAIC in initially presented under T3 tumors may be the best candidate for salvage resection.

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## Surgical Outcomes of Hepatocellular Carcinoma with Bile Duct Tumor Thrombus: a Korean Multicenter Study

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**Research Purpose:** The long-term outcomes after resection for hepatocellular carcinoma (HCC) with macroscopic bile duct tumor thrombus (BDTT) are unclear. This multicenter study was conducted to determine the prognosis of HCC patients with macroscopic BDTT who underwent resection with curative intent.

**Materials and Methods:** Of 4308 patients with HCC from four Korean institutions, this single-arm retrospective study included 73 patients (1.7%) who underwent resection for HCC with BDTT.

**Results:** Jaundice was accompanied in 34 patients (46.6%). According to Ueda classification, BDTT was type 2 in 34 cases (46.6%) and type 3 in 39 cases (53.4%). Biliary decompression was performed in 33 patients (45.2%), decreasing the median lowest bilirubin level to 1.4 mg/dL before surgery. Systematic hepatectomy was performed in 69 patients (94.5%), and concurrent bile duct resection was performed in 31 patients (42.5%). Surgical curability types were R0 ( $n = 57$ , 78.1%), R1 ( $n = 11$ , 15.1%), and R2 ( $n = 5$ , 6.8%). Poor differentiation was observed in 54 cases (74.0%). Portal vein tumor thrombus was found in 21 cases (28.8%). In three cases (4.1%) mixed tumor of HCC and cholangiocarcinoma was diagnosed. Patient survival rates were 76.5% at 1 year, 41.4% at 3 years, 32.0% at 5 years, and 17.0% at 10 years. Recurrence rates were 42.9% at 1 year, 70.6% at 3 years, 77.3% at

5 years, and 81.1% at 10 years. Results of univariate survival analysis showed that maximal tumor size, bile duct resection, and surgical curability were significant risk factors for survival, and surgical curability was a significant risk factor for recurrence. Multivariate analysis did not reveal any independent risk factors. Following R0 resection (n=57), survival was significantly affected by maximal tumor size (p=0.035), but not by Ueda type (p=0.682) or concurrent BDR (p=0.141). In patients who underwent R0 resection and had no major vascular invasion (n=44), concurrent BDR did not significantly affect survival (p=0.079) or recurrence (p=0.803). Among these patients, BDR did not significantly affect survival (p=0.246) or recurrence (p=0.376) in patients with Ueda type 2 HCC (n=18) or in those with Ueda type 3 HCC (n=26; p=0.109 and 0.952, respectively). In patients who experienced recurrence after resection (n=52), the common sites of initial HCC recurrence were the liver (n=29, 55.8%), lung (n=6, 11.5%), and abdomen including the biliary system (n=4, 7.7%) and bone (n=1, 1.9%), with lymph node metastasis occurring in 6 (11.5%) and multiple recurrence in 6 (11.5%).

**Conclusions:** The results of this multicenter study revealed relatively favorable long-term results for HCC patients with macroscopic BDTT after surgery with curative intent. Therefore, extensive surgical procedure should be strongly recommended for these patients when complete resection is anticipated.

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### Who Has Better Prognosis in the Patients with Resected Multiple HCC

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**Background:** The role of hepatic resection in patients with multiple hepatocellular carcinoma (HCC) is still a matter of debate. However, surgical resection is possible with various types of hepatectomies.

**Methods:** Consecutive patients who underwent curative hepatic resection for multiple hepatocellular carcinoma at the National Cancer Center, Republic of Korea from April 2001 to December 2008 were enrolled in this retrospective study. Clinicopathologic factors, cancer-specific survival, and disease-free survival were analyzed. Prognostic factors were also analyzed including AFP, radiologic, and pathologic data.

**Results:** The 140 patients in this study had a median follow-up of 33.0 months. Five-year overall and disease-free survival rate were 50.6% and 22.7%, respectively. In univariate analysis of overall and disease-free survivals, preoperative AFP level >400 ng/mL, radiologic beyond Milan criteria, pathologic tumor number >3, total tumor size >10 cm, microvascular invasion, major vessel invasion, serosal invasion, and intrahepatic metastasis were poor prognostic factors. In multivariate analysis, pathologic tumor number >3 and microvascular invasion were independent risk factors for overall survival (HR: 1.783, 95% CI 1.022-3.109, p=0.042 of tumor number >3; HR : 2.195, 9%CI 1.119-4.307, p=0.022 of microvascular invasion). For disease-free survival, preoperative AFP level >400 ng/mL and microvascular invasion were independent risk factors (HR: 1.772, 95% CI 1.115-2.816; p=0.015 of AFP level >400 ng/mL; HR: 2.030, 95% CI 1.187-3.470, p=0.010 of microvascular invasion).

**Conclusions:** Preoperative AFP level, tumor number, and microvascular invasion were independent risk factors in patients of resected multiple HCC.