Laparoscopic Major Hepatectomy versus Minor Hepatectomy for Colorectal Liver Metastasis: A Retrospective Cohort Study

Huisong Lee, Jin Seok Heo, Jin Young Park, Sangmin Youn, Wooil Kwon, Seong Ho Choi, Dong Wook Choi

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Background
Laparoscopic hepatectomy is increasing for the treatment of colorectal liver metastasis (CRLM). The aim of this study is to evaluate the outcomes of laparoscopic major hepatectomy compared with minor hepatectomy in the patients with synchronous and metachronous CRLM.

Methods
From January 2008 to December 2012, we identified 48 patients who underwent curative intend laparoscopic hepatectomy for CRLM. The patients were divided according to the types of hepatectomy. Wedge resection and lateral sectionectomy were regarded as minor hepatectomy. The perioperative and oncologic outcomes were investigated.

Results
Thirty three patients underwent laparoscopic minor hepatectomy and 15 patients underwent major hepatectomy. Laparoscopic major hepatectomy was associated with longer operation time, larger blood loss, and transfusion compared with minor hepatectomy. \( p < 0.001, p = 0.014 \) and \( p = 0.048 \). However, there were no significant differences in complication rate and disease free survival after median follow-up period 22 months \( p > 0.999 \) and \( p = 0.790 \).

Conclusion
Laparoscopic major hepatectomy is as safe and effective as minor hepatectomy for the treatment of CRLM.

Keywords: Laparoscopic Surgery, Colorectal Cancer, Liver Metastasis

Surgical Treatment of Large Hydatid Hepatic Cysts

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There were 224 patients with hepatic hydatid, who underwent surgery. 142 patients underwent partial pericystectomy, suturing residual cavity with external drain. Liver resection was used for 21 patient, whereat anatomic liver resection was used for 2 patients, 15 patients underwent atypical resection, 4 - hemihepatectomy. The other cases involved opened and closed hydatidectomy. In order to maintain secondary disease prophylaxis, 97 patients were subjected to the developed technique, which involves residual cavity treatment with 0,5% alcoholic solution of fenbendazole. It was found, that the operation of choice for patients with large hydatid hepatic cysts is hepatic resection or total pericystectomy. Due to the germicidal efficiency of 0,5% alcoholic solution of fenbendazole, using it for residual hydatid hepatic cysts cavity treatment is expedient.

Introduction
Regarding hepatic echinococcosis surgery problems, there is neither shared vision among specialists for every surgical method, nor common designation for surgical interventions. The latter causes differences in choice of surgery method and understanding the essence of surgical intervention. As defined in other research papers\(^1\)\(^-\)\(^4\), it is obvious that operation is justified both when parasite is alive and when it is dead, which causes cyst walls calcinosis, empyema and burst, commonly, with open external fistula.

Materials and Methods
As of from 2010 to 2013, 224 patients with hepatic echinococcosis underwent surgery: 137 female (61, 2%) and 87 male patients (38, 8%); their age varied from 15 to 56 (average age-32, 7 years). Ultrasonography is the most effective and accurate diagnosis method for hepatic echinococcosis and big cysts in particular.
It is should be mentioned, that ultrasonography data helps to show the presence of dead or alive parasite, find the location of the process and choose surgical intervention technique. In order to maintain secondary disease prophylaxis, the residual cavity was treated with 0,5% alcoholic solution of fenbendazole (patent № 345 under 17.07.2001 and innovation proposal № 1942 under 24.09.2001)\(^5\). The efficiency of germicide alcohol solution of fenbendazole was evaluated by microscopic analysis of echinococcosis cyst fluid before and after the treatment as well as fibrous capsule cavity fluid. The cyst fluid before inserting germicide alcohol solution of fenbendazole had many living protoscolexes found with normal structure. After the treatment, fibrous capsule cavity fluid contained only dead destructed protoscolexes and small fragments of chitin parasite membrane\(^6\).

**Results and Discussion**

All surgical interventions related to hydatidectomy, prevention of contamination of the surrounding organs and tissues by hydatid embryo elements and liquidation of fibrous capsule residual cavity. Significant corrections to the surgical plan can be primarily introduced after the laparotomy\(^1,3,7\). An ectomy of fibrous capsular cysts without rupture of the lumen is definitely the most preferable solution. However, performing this kind of operation should not be considered as the only possible solution, in order to decrease the risk of surgical intervention. Cysts with marginal location but within the large liver vessels area should not be eliminated with the entire fibrous capsule. It is more rational to leave a part of the fibrous capsule to prevent possible complications\(^7,8\).

Cysts elimination with fibrous capsule or total pericystectomy was implemented in 58 (25,9 %) cases. Echinococcosis surgical practice proves, that when hydatid grows and develops, fibrous membrane soaks in embryo elements. In view of this, the authors conclude that radical changes and improvement in the hepatic hydatid treatment results depend on the extent of elimination of cyst’s fibrous membrane\(^9\). Large hydatid cysts (larger than 9 cm) were diagnosed for 89% of operated patients. There were also commonly found such complications as: empyema, burst or biliary passages compressions. Thus, choice operation for those patients was opened hydatidectomy. Performing this surgical operation requires taking measure to isolated organs and tissues in the abdominal cavity from hydatid embryo elements to prevent relapse. It includes elimination of the hydatid cyst fluid, antiparasitic treatment of the residual cavity of fibrous capsule\(^3,8\). For this purpose, there was elaborated an intraoperative antiparasitic treatment technique using 0,5 % alcohol solution of fenbendazole, which has fatal effect on hydatid embryo elements.

The choice of sufficient liquidation technique for residual cavity can establish smooth post-operation and reduction of patient’s hospital stay period. However, as mentioned before, total pericystectomy is not always possible to perform, especially when cysts are located in the large liver vessels area. Other options are pericystectomy, suturing the residual cavity and external drain. Thereby, all of the supervised patients had favorable results.

Indication of biliary fistula in fibrous capsule did not cause any complications in process of eliminating of large hydatid cysts. 2-5 mm fistulas underwent suturing with flat-topped or Z-shaped stitches. This might be the reason for low or medium chance of complications such as biliary fistula formations after large cysts elimination in post-operation period. Unfound fistula in post-operation period can delay cicatrization of the residual cavity, and if biliary passages are wide enough, residual cavity fluids can get inside them. Correct liquidation of the residual cavity after hydatidectomy commonly contributes to successful post-operation process. Drain elimination was performed only after reducing the cavity volume to the drain diameter by ultrasonography and fistulography results. Preliminary drain reduction without full obliteration of the residual cavity of fibrous capsule may lead to empyema of the cavity or abscess formation.

As many authors specialized in echinococcosis surgery agree\(^1,2,4,7-10\), the main surgery method for large hydatid cysts...
Poster Exhibition

Results of Extensive Resection Interventions in Focal Hepatic Lesions

Toksanbay DS
Department of Hepatopancreatobiliary Surgery and Liver Transplantation Syzganov’S National Scientific Center of Surgery, Almaty, Republic of Kazakhstan

Improving resection interventions in the surgical treatment of parasitic, benign and malignant focal hepatic lesions is the primary method of surgical treatment and the actual direction in liver surgery.

The purpose of the work. Improve the results of extensive resection interventions (hepatectomy and extended hemihepatectomy) of the liver on the various focal hepatic lesions.

Material and Methods
During the period from 2004 to 2013, resections performed 161 interventions for various focal hepatic lesions in patients aged 2 to 75 years. Size pockets ranged from 4 to 28 cm.

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Poster Exhibition

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Material and Methods
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References
Diameter. Among all patients underwent surgery the bulk made extensive resection - 105 (65.21%) patients. The scope and method of liver resection depended on the clinical entities, the prevalence of focal lesions and to involve them in the trunk vascular ductal structures.

Results and Discussion

Extensive surgery to remove more than 40% of the liver parenchyma presented mainly anatomical resections: standard and extended hemihepatectomy - 75 (71.42%). Extensive non-anatomic resection interventions were performed in 17 (16.19%) patients. The following anatomical resection intervention: extended right-sided hemihepatectomy in 13 (17.33%), right-sided hemihepatectomy in 49 (65.34%), extended left-sided hemihepatectomy in 2 (2.67%) and the left-sided hemihepatectomy in 11 (14.66%) patients. Combined extensive resections were performed in 13 (12.39%) patients: extended right-sided hemihepatectomy + atypical segmentectomy (IIISg) + hepaticojejunostomy Roux loop for 1 patient, the left-sided caval lobectomy + atypical bisegmentektomiya (V-VISg) in 4 patients, right-sided hemihepatectomy + echinococcectomy of the left lobe of the liver in 3 patients, bisegmentektomiya (IV-VSg) + standard gastropancreatoduodenectomy resection in 1 patient and combined atypical resections were performed in 4 patients. Among all the patients operated on after extensive resection interventions specific complications occurred in 17 (16.19%) patients. The analysis revealed that when the extensive anatomical resection of specific complications was significantly (compared with non-anatomic resections atypical): acute liver failure in 1 case, the external biliary fistula in 1 case and intra-abdominal bleeding in 3 patients. After extensive resection procedures on the liver mortality was 8 (7.61%) patients. When anatomical interventions 3 patients died: in one case, acute liver failure, otherwise arrosive bleeding, DIC, and in the third case, an infectious-inflammatory complications and sepsis. Cause of postoperative mortality in 5 patients after resection of atypical interventions: acute liver failure in 2 patients, and massive blood loss with the subsequent development of DIC in 3 patients.

Conclusions

The presence of extensive experience performing extensive liver resection allows large transactions in the anatomical variant that the process improvement techniques of surgery are reduction in the incidence of postoperative complications specific.

Keywords: Hepatic Lesions

PE-04

We Reported Patients with Focal Eosinophilic Infiltration Mimicking Hepatocellular Carcinoma (HCC)

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Introduction

Focal eosinophilic infiltration is rare that in patients with malignancies may mimic malignant hepatic nodules. We describe case in which focal eosinophilic infiltration of the liver with HCC. The imaging findings similar to those observed in hepatocellular carcinoma (HCC).

Case

A 59-year-old man who had hepatic nodule was detected at routine regular check up in our hepatology department. He had a history of chronic B-viral hepatitis, first diagnosed 22 years ago. Laboratory examination including αFP level showed no abnormality other than peripheral blood eosinophilia (19.2%), and there was no evidence of parasitic infection or allergy, but he had ingestion of raw liver of cow years ago.

Conventional CT showed that in segment 8 of the liver, a round nodule about 1.4 cm in diameter. Primovist MR imaging, however, depicted another nodule in the subcapsular area of segment V. A 2.2 cm encapsulated
hypervascular HCC in S8. Another two ill-defined small (0.7 cm) subcapsular Primovist-defect lesions in S8 and S6 suggested the malignant potential. We planned S8 segmentectomy and wedge resection of S6. During intraoperative ultrasound, there were no masses previously mentioned areas. Wedge resection of segment 6 was performed and specimen was sent for frozen examination and the result was small cell change, suggestive of hepatocellular carcinoma, well differentiated. We completed segmentectomy of S8. Grossly, the nodule in this segment previously reported in the image studies could not be defined. The final pathologic result was granulomatous inflammation with central necrosis and eosinophilic infiltration, consistent with visceral larva migrans. There was no cancer cells were observed. He was suffered Rt pleural effusion and thoracentesis was performed. Peripheral blood eosinophilia was disappeared without treatment. The patient is in good condition without the evidence of HCC during 2 years follows up.

Conclusions
Focal eosinophilic infiltration is rare but in patients with chronic liver cirrhosis may mimic malignant hepatic nodules. In the cases with peripheral blood eosinophilia caution have to be given and, timed serial blood test and image studies maybe helpful to distinguish from HCC.

Keywords : Focal Eosinophilic Infiltration, Hepatocellular Carcinoma

Suppressive Effect of Combining Sorafenib with Vitamin K on Migration of Hepatocellular Carcinoma Cells by Inhibition of the HGF/c-Met Pathway

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Background
Vitamin K plays a role in controlling cell growth, including inhibition of growth of hepatocellular carcinoma cells. In the absence of vitamin K, des-gamma-carboxy prothrombin (DCP) is released into the blood and DCP levels reflect worse tumor behavior and prognosis for patients with HCC. However, DCP was reported to increase in patients treated with sorafenib, despite its therapeutic efficacy. Antiangiogenic effects of sorafenib lead to impair vitamin K uptake and to induce DCP in HCC. Here, we examined the sorafenib and vitamin K individually and combination of two agents on the inhibition of migration and metastatic potential of HCC cells.

Materials and Methods
HepG2 cells (HCC cell line) were cultured and then treated with hepatocyte growth factor (HGF). E-cadherin expression, phospho-Met and phospho-extracellular signal-regulated kinase (ERK) levels were measured by using special immunohistochemical stains and Western Blot and cell migration was also measured by Oris cell migration assay and scratch assay.

Results
We found that combining sorafenib with vitamin K significantly increased expression of E-cadherin compared to the single agent treatment. With the Oris invasion assay and scratch assay, HGF stimulated HepG2 cells treated with combining sorafenib with vitamin K showed greatly compromised migration ability. Phospho-Met and phospho-ERK levels were significantly decreased by combining sorafenib with vitamin K.

Conclusion
Sorafenib and vitamin K can work synergistically to inhibit the migration and proliferation of HCC cells. This finding suggests that combining sorafenib with vitamin K might have potential for a clinical application that could enable the use of lower and less toxic dose of sorafenib, thus improving tolerability and reducing adverse effects.
**Keywords**: Hepatocellular Carcinoma (HCC), Sorafenib, Vitamin K, Des-Gamma-Carboxy Prothrombin (DCP)

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**PE-06**

**Prognostic Impact of Preoperative Neutrophil-Lymphocyte Ratio on Outcome Following Surgical Resection For Hepatocellular Carcinoma**

Mao Wei, Xuguang Hu, Hee Jung Wang

Ajou University

**Backgrounds/Aim**

Increased systemic inflammation is associated with poor survival in various type of malignancy including hepatocellular carcinoma (HCC). It can be detected by neutrophil-lymphocyte ratio (NLR) which has recently been reported as a predictor of HCC. However, prognostic value of NLR in HCC still remains inconclusive. In this study, we aimed to evaluate the association between preoperative NLR and its oncologic outcome of patients with HCC who underwent surgical resection (SR).

**Methods**

Retrospective analysis was performed on a database of patients who underwent SR for HCC between 2001 and 2011. Patients with available documented preoperative white blood cell differential count were enrolled in this study. The cut-offs of continuous variables including preoperative NLR were decided by Receiver operating characteristic (ROC) curve analysis. Univariate and multivariate analyses were performed to identify predictive factors of recurrence and death after SR.

**Results**

A total of 377 patients were included in this study. After a median follow-up of 37 months, 5-year disease-free, and overall survival rates were 41.1% and 68.5%, respectively.

The defined cut-off values of NLR by ROC curve analysis was 2.125 (AUC = 0.634, p < 0.001). Independent risk factors for patient’s survival after SR included macroscopic vascular invasion (hazard ratio [HR], 2.2457 [range, 1.3353-3.7768]), intrahepatic metastasis (HR, 1.8124 [range, 1.1218 - 2.9281]), positive resection margin(HR, 1.7751 [range, 1.0177 - 3.0962]), AST > 42 IU/L (HR, 2.3134 [range, 1.4651 to 3.6529]), cirrhosis(HR, 1.5167 [range, 1.0219 - 2.2511]), Tumor size > 5.2 cm(HR, 3.7763 [range, 2.2307 to 6.3928]) and preoperative NLR (HR, 2.1423 [range, 1.3771 to 3.3326]). However, multivariate analysis did not show an independent impact of preoperative NLR on tumor recurrence.

**Conclusion**

Elevated preoperative NLR can be easily obtained and reliable biomarker for assessing oncologic outcome after SR for HCC.

**Keywords**: Hepatocellular Carcinoma, Surgical Resection, Neutrophil-Lymphocyte Ratio

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**PE-07**

**Influence of Preoperative Transcatheter Arterial Chemoembolization on Gene Expression in the HIF-1α Pathway in patients with Hepatocellular Carcinoma**

Mao Wei, Weiguang Xu, Hee Jung Wang

Ajou University

Although transcatheter arterial chemoembolization (TACE) is the most common treatment option in patients with hepatocellular carcinoma (HCC), its clinical benefits remain still controversial. Since TACE induces hypoxic necrosis in tumors, hypoxia-inducible factor 1α (HIF-1α) could critically affect biology in residual tumors after TACE treatment and subsequent prognosis. However, HIF-1α and its prognostic relevance in TACE have rarely been examined.
in human specimens. In the current study, we investigated the prognosis and expression of genes regulated by HIF-1 α in HCC patients receiving preoperative TACE for the first time. In total, 35 patients with HCC (10 patients undergoing preoperative TACE) were retrospectively studied. The prognostic significance of TACE was analyzed using Kaplan-Meier and Cox regression models. Protein levels of HIF-1 α and mRNA levels of HIF-1 α - associated genes were examined using immunohistochemistry (IHC) and real-time RT-PCR, respectively. Preoperative TACE was significantly associated with increased 2-year recurrence rate (80 vs. 36%, P=0.00402) and shorter disease-free survival (DFS) time (11.9 vs. 35.7 months, p=0.0182). TACE was an independent prognostic factor for recurrence (p=0.007) and poor DFS (p=0.010) in a multivariate analysis. Immunohistochemical staining revealed in vivo activation of HIF-1 α in human specimens treated with TACE. Notably, protein levels of HIF-1 α were significantly increased in TACE tissues demonstrated by IHC. Transcriptional targets of HIF-1 α showed mRNA expression patterns consistent with activation of HIF-1 α in TACE tissues. Our findings collectively demonstrate that preoperative TACE confers poor prognosis in HCC patients through activation of HIF-1 α.

**Keywords**: Hepatocellular Carcinoma, Transcatheter Arterial Chemoembolization, Prognosis, Hypoxia, Hypoxia-Inducible Factor-1 α

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Reappraisal of Bisegmentectomy 7-8 for Preserving Liver Volume as Alternative to Extensive Liver Resection

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**Background**

Right superior liver resection named bisegmentectomy 7-8 has been considered as a safe alternative to extensive liver resection in patients with a thick inferior right hepatic vein (IRHV). However, some investigators insisted the feasibility of bisegmentectomy 7-8 independent of the presence of a large IRHV due to the anastomosis between the minor and main hepatic veins. Thus, we reviewed our recent clinical experience of bissegmentectomy 7-8.

**Materials and Methods**

From May 2013 to May 2014, 6 consecutive patients underwent bisegmentectomy 7-8 due to hepatocellular carcinoma for 5 patients and colon cancer liver metastasis for one patient. Curative liver resections were performed for all patients without perioperative mortality.

**Results**

The median operation time was 320 minutes (251–375 minutes) and median amount of blood loss was 850 mL (210–920 mL). Three patients did not have IRHV and one patient had thin IRHV. Two patients had thick IRHV of which diameter was greater than 5mm. One patient without IRHV had ascites until postoperative 2 weeks and the patient with thin IRHV had large amount of pleural effusion. The median peak serum aspartate aminotransferase (AST) and alanine aminotransferase (ALT) level of the patient without IRHV or with thin IRHV was 1036 IU/mL and 1005 IU/mL, respectively. The mean peak serum AST and ALT level of the patients with thick IRHV was 575 IU/mL and 337.5 IU/mL, respectively. Serum AST and ALT level decreased below 50 IU/mL within two weeks after operation in all cases. Ischemic or infarcted change of remnant right posterior liver was observed on follow-up CT scan in all patients without thick IRHV.

**Conclusions**

Bisegmentectomy 7-8 could be performed as an alternative to major liver resection. Bisegmentectomy 7-8 without thick IRHV may cause of ischemic change of remnant right liver. Thus, thick IRHV may be necessary for safe bisegmentectomy 7-8.

**Keywords**: Right Superior Sectionectomy, Bisegmentectomy, Inferior Right Hepatic Vein
Impact of Graft Regeneration to the Recurrence of Hepatocellular Carcinoma after Living Donor Liver Transplantation

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Background
It has been suggested that tumor recurrence after resection for hepatocellular carcinoma (HCC) was related with remnant liver regeneration. In living donor liver transplantation (LDLT), graft liver usually experience regeneration and this may stimulate the growth of microscopic HCC tumors. The aim of this study was to assess the changes in graft volumes after LDLT and its relations with the recurrence of HCC.

Methods
A total 140 liver transplantations were performed for patients with HCC between September 2005 and December 2012. Of them, deceased donor and unavailable data were excluded. All patients were measured preoperative and postoperative at 1 week and 4 weeks graft liver volume by volumetric computed tomography (CT). The study patients were divided into two subgroups according to median value of graft-recipient weight ratio (GRWR) and increasing rate of graft liver at postoperative 1 week and 4 weeks.

Results
Of the 128 recipients, 16 recipients had a recurrence of HCC. Recurred patients showed significantly higher level or incidence of pre-transplant alpha-fetoprotein (AFP), Protein induced by vitamin K antagonist (PIVKA-II) and largest size of HCC, portal vein invasion, microvascular invasion, and satellite nodule in pathologic findings. Increasing rate of graft liver at postoperative 1 week and 4 weeks were significantly higher in lower GRWR group than those in higher GRWR group, respectively. There were no differences in preoperative GRWR and increasing rate of graft liver at postoperative 1 week and 4 weeks between the two groups. Recurred HCC patients showed more ‘beyond Milan criteria’ and higher tumor markers than non-recurred patients.

Conclusion
This study showed that the lower GRWR group has higher graft regeneration rate than those in higher GRWR group. However, this study could not find significant relation between the recurrence of HCC and graft regeneration.

Keywords: HCC, Recurrence, Regeneration

<table>
<thead>
<tr>
<th>Table 1. Demographics, clinical characteristics and pathologic findings</th>
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<tbody>
<tr>
<td><strong>No Recur</strong> (N=112, 87.5%)</td>
</tr>
<tr>
<td>Age (years)</td>
</tr>
<tr>
<td>Male gender, n(%)</td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
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<tr>
<td>MELD score</td>
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<tr>
<td>Viral hepatitis B, n(%)</td>
</tr>
<tr>
<td>GRWR (%)</td>
</tr>
<tr>
<td>within Milan criteria, n(%)</td>
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<tr>
<td>within UCSF criteria, n(%)</td>
</tr>
<tr>
<td>Alpha-fetoprotein (ng/mL)</td>
</tr>
<tr>
<td>PIVKA-II (mAU/mL)</td>
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<tr>
<td>Graft weight (gm)</td>
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<td>5 years Graft Survival rate (%)</td>
</tr>
</tbody>
</table>

Pathologic findings

| Largest size (cm) | 2.48 ± 1.51 | 3.68 ± 1.69 | 0.004 |
| Viable tumor | 2.1 ± 1.9 | 2.0 ± 2.2 | NS |
| Portal vein invasion, n(%) | 2 (1.8) | 5 (31.2) | < 0.001 |
| Microvascular invasion, n(%) | 20 (17.9) | 12 (75.0) | < 0.001 |
| Satellite nodule, n(%) | 12 (10.7) | 5 (31.2) | 0.039 |

Abbreviation: BMI, body mass index; MELD, Model for End-stage Liver Disease; GRWR, graft-recipient weight ratio; PIVKA, Protein induced by vitamin K antagonist
### Table 2. Volumetric data of graft liver

<table>
<thead>
<tr>
<th></th>
<th>No Recur (N=112, 87.5%)</th>
<th>Recur (N=16, 12.5%)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>CT volumetry / Increasing rate</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preoperative (mL)</td>
<td>805.5 ± 142.0</td>
<td>811.2 ± 141.3</td>
<td>NS</td>
</tr>
<tr>
<td>Postop. 1 week (mL)</td>
<td>1002.4 ± 159.4</td>
<td>1012.5 ± 132.4</td>
<td>NS</td>
</tr>
<tr>
<td>Increasing rate (%)</td>
<td>33.1 ± 19.8</td>
<td>33.2 ± 15.2</td>
<td>NS</td>
</tr>
<tr>
<td>Postop. 4 weeks (mL)</td>
<td>1089.0 ± 165.3</td>
<td>1101.6 ± 166.6</td>
<td>NS</td>
</tr>
<tr>
<td>Increasing rate (%)</td>
<td>45.4 ± 25.7</td>
<td>45.3 ± 22.9</td>
<td>NS</td>
</tr>
<tr>
<td>GRWR, n(%) &lt; 1.16%</td>
<td>70 (62.5)</td>
<td>8 (50.0)</td>
<td>NS</td>
</tr>
<tr>
<td>GRWR ≥ 1.16%</td>
<td>42 (37.5)</td>
<td>8 (50.0)</td>
<td>NS</td>
</tr>
<tr>
<td>Increasing rate at &lt; 33.1%</td>
<td>62 (55.4)</td>
<td>7 (43.8)</td>
<td>NS</td>
</tr>
<tr>
<td>Increasing rate at ≥ 33.1%</td>
<td>50 (44.6)</td>
<td>9 (56.2)</td>
<td>NS</td>
</tr>
<tr>
<td>Increasing rate at &lt; 45.4%</td>
<td>61 (54.5)</td>
<td>7 (43.8)</td>
<td>NS</td>
</tr>
<tr>
<td>Increasing rate at ≥ 45.4%</td>
<td>51 (45.5)</td>
<td>9 (56.2)</td>
<td>NS</td>
</tr>
</tbody>
</table>

Abbreviation: GRWR, graft-recipient weight ratio; CT, computed tomography

### Table 3. Increasing rate of graft liver according to graft-recipient weight ratio (GRWR)

<table>
<thead>
<tr>
<th></th>
<th>GRWR &lt; 1.16 % (N=78)</th>
<th>GRWR ≥ 1.16 % (N=50)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increasing rate at Postop. 1 week (%)</td>
<td>38.3 ± 19.3</td>
<td>25.0 ± 16.2</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Increasing rate at Postop. 4 weeks (%)</td>
<td>52.7 ± 25.7</td>
<td>33.9 ± 20.0</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Increasing rate at &lt; 33.1%</td>
<td>31 (39.7)</td>
<td>38 (76.0)</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Increasing rate at ≥ 33.1%</td>
<td>47 (60.3)</td>
<td>12 (24.0)</td>
<td></td>
</tr>
<tr>
<td>Increasing rate at &lt; 45.4%</td>
<td>30 (38.5)</td>
<td>38 (76.0)</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Increasing rate at ≥ 45.4%</td>
<td>48 (61.5)</td>
<td>12 (24.0)</td>
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### PE-10

**Liver Tumor**

**Young-Dong Yu, Dong-Sik Kim, Sung-Won Jung, Sung-Ock Suh**

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**Background**

Primary tumors of the diaphragm have a rare incidence and prevalence. Only about 150 cases have been reported in literature to date. Most primary tumors of the diaphragm are benign. Even after recent major advances in imaging technology, diaphragmatic tumors still present as a diagnostic dilemma and are difficult to diagnose preoperatively or without a pathological diagnosis.

**Case**

A 57 year-old woman was admitted due to abdominal pain. Computed tomography, MRI revealed tumor of the liver. On exploration large mass was noted beneath diaphragm. Tumorectomy and partial diaphragmatic excision was performed. Histologic diagnosis revealed chronic caseating necrosis consistent with tuberculosis. She was treated with antituberculosis medication.

**Conclusions**

This case highlights the unusual presentation of a diaphragmatic lesion and how it can be mistaken as an atypical liver mass.

**Keywords**

Diaphragm, Liver Tumor

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### PE-11

**Surgical Resection of a Solitary Lymphnode Metastasis from Hepatocellular Carcinoma: Resection or Systemic Treatment**

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**Introduction**

Hepatocellular carcinoma (HCC) is the fifth most common solid tumor in the world, but outcomes after hepatic resection remain still unsatisfactory due to recurrence. The most frequent site of extrahepatic metastases is the lung, followed by the adrenal gland and bone. Lymph node (LN) metastases after HCC resection are uncommon and there is currently no standard treatment. We describe the surgical resection of a solitary LN metastasis from HCC.

**Presentation of Cases**

Jan. 2013, a patient was performed left hepatectomy due to...
HCC. After 6 months, intrahepatic recurrence was diagnosed, and he received TACE, twice. In 4 months after the last TACE, and 13 months after hepatic resection, a single LN metastasis was found in the PET scan. He was 58-year-old man and chronic hepatitis B patient. He had no jaundice and Child A state. The tumor marker, AFP was 92.84 ng/mL, and PIVKA-II was 8850 mAU/mL. Because there was no other metastasis in the PET scan we decided surgical resection.

Conclusion
LN metastases at distant sites without metastases in the hepatoduodenal ligament are relatively rare. Patients with a solitary metastasis from a controlled intrahepatic tumor can be treated surgically, and good outcomes have been reported. However, it is still difficult to decide solitary LN metastasis from hepatocellular carcinoma whether to be resected or to be received systemic treatment

Keywords : Hepatocellular Carcinoma, Single LN Metastasis

A Prospective Randomized Study Comparing Radiofrequency Ablation and Hepatic Resection for Hepatocellular Carcinoma

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Department of Surgery, Seoul National University College of Medicine

Introduction
Some local ablative therapies are known to be effective and safe to treat small hepatocellular carcinomas (HCCs) and of them, radiofrequency ablation (RFA) has been considered the most promising one. However, it is still unclear whether RFA is as effective as hepatic resection (HR), a traditional standard treatment modality, for small HCCs.

Methods

Patients who were newly diagnosed with a solitary HCC between July 2005 and September 2009 were randomized to the HR and RFA groups. Inclusion criteria were as follows; age ≥ 20 years, ≤ 70 years, Child-Pugh A, a maximal diameter of the tumor ≥ 2cm, ≤ 4cm, no previous treatment history, and platelet count > 80,000/mm3.

Results
Twenty-nine and thirty-four patients were enrolled and prospectively followed in the HR and RFA groups, respectively, on intention-to-treat (ITT) basis. The 5-year overall survival rate was 96.6% and 88.8% in the HR and RFA group, not a statistically significant difference (P=0.748 by Log Rank, 0.726 by Breslow). HCC recurrence developed in 39 patients: 15 patients in the HR and 24 in the RFA group. The 3- and 5-year disease-free survival rates for the HR group were significantly superior to those for the RFA group (65.4%, 42.9% vs. 44.1%, 31.2%, p=0.084 by Log Rank, 0.030 by Breslow). When the patients were re-grouped according to actual treatment modalities, the 3- and 5-year disease-free survival rates were 64.4% and 42.0% for the HR group (n=31) and 43.8% and 30.3% for the RFA group (n=32). It was also superior in the HR group (p=0.053 by Log Rank, 0.035 by Breslow). Intrahepatic local recurrence tended to develop more frequently in the RFA group (P=0.0416), while the frequency of intrahepatic distant and extrahepatic recurrence was similar between two groups. A total of 28 complications developed in 20 patients (31.7%) after treatment: 11 patients in the HR and 9 in the RFA group. However, there was no significant difference in the frequency and severity of complication between two groups. On multivariate analysis, only the platelet count was associated with recurrence. The platelet count was significantly lower in patients with recurrence (p=0.0008).

Conclusions
HR was significantly superior to RFA in terms of disease-free survival. However, the overall survival was not different between the two treatment modalities. Further studies are needed to validate the results of the present study.

Keywords : Hepatocellular Carcinoma, Hepatic Resection,
Intrahepatic Sarcomatoid Cholangiocarcinoma for Resection of Segment 3 and 4 of the Liver

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Background
Sarcomatoid features are occasionally seen in various types of epithelial tumors, and it is sometimes difficult to differentiate between sarcomatoid carcinoma and true sarcoma. Most sarcomatoid carcinomas in the liver are thought to be sarcomatoid hepatocellular carcinomas. Recently, there have been reports demonstrating sarcomatous changes in cholangiocarcinomas. This type of tumor is defined as “sarcomatous intrahepatic cholangiocarcinoma” in the WHO classification of tumors. We report herein a patient with intrahepatic sarcomatous cholangiocarcinoma who underwent a hepatic resection. The main part of the tumor consisted of pleomorphic spindle and giant cells.

Case Reports
A 63-year-old male patient presented with a liver mass. Computed tomography revealed a well-demarcated, low-attenuated mass in the left lobe of the liver. A radical surgery, which included segment 4 and 3 resection with preservation of the left hepatic duct and the segment 2 was performed. The histopathological examination revealed that the tumor did not involve the liver parenchyma and had no lymph node metastasis. The tumor was 3×4 cm in size. Microscopically, the tumor cells were contained in the sarcomatous component, and adenocarcinoma component on histological mapping. Immunohistochemical staining for cytokeratin was positive in the sarcomatous component. The diagnosis confirmed a sarcomatoid cholangiocarcinoma.

4 months after surgery, the patient died of pneumonia.

Conclusions
To the best of our knowledge, only 17 cases of intrahepatic sarcomatoid cholangiocarcinoma have been reported in the English-language literature. It has been reported that the prognosis for intrahepatic sarcomatoid cholangiocarcinoma is worse than that for intrahepatic cholangiocarcinoma. We report herein a patient with intrahepatic sarcomatoid cholangiocarcinoma who underwent a hepatic resection. The main part of the tumor consisted of pleomorphic spindle and giant cells.

Keywords : Resection of Segment 3 and 4 of the Liver, : Intrahepatic Sarcomatoid Cholangiocarcinoma

Laparoscopic Management of a Giant Hepatic Cyst

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Background
Liver cysts are often asymptomatic. Symptomatic liver cysts are uncommon and can be managed by percutaneous aspiration, laparoscopic/open unroofing, or excision. Recently, there have been a number of reports of successful laparoscopic cyst excision of symptomatic hepatic cysts. Our aim is to review our experience with management of giant hepatic cyst by using laparoscopic hepatic excision or unroofing techniques.

Methods
We review of patients with liver cysts between 2005-2014 was performed. There were 7 simple hepatic cyst and one patient had a cystadenoma in pathologic finding, Pain was the main symptom in 5 patients and early satiety after diet in one patient. The average cyst size was 12.9cm (9-18cm). We underwent laparoscopic hepatic excision in 4 patients and
unroofing in 3 patients.

**Results**

Average operation time was much shorter in unroofing group than laparoscopic excision group (167 minutes versus 245 minutes). All patients had an uneventful recovery, with no major morbidity. All patients were discharged from 5th to 7th postoperative day. Symptomatic relief and reduction in abdominal girth were obtained in all patients, persisting for an average follow-up period of 43 months. No progression of cystic disease has been observed clinically or by computed tomography and hepatic function was preserved. All patients had no complications.

**Conclusions**

Laparoscopic management is effective and safe procedures in symptomatic giant hepatic cyst and affords a relatively shorter hospital stay. We feel that there is a considerable learning curve with the technique. Longer follow-up is needed in a larger number of patients to determine the duration of benefit between the excision and unroofing techniques for highly symptomatic hepatic cyst.

**Keywords:** Laparoscopic, Giant Hepatic Cyst

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*Positive Immunostaining of Sal-Like Protein 4 (SALL4) is Associated with Poor Patient Survival Outcome in the Large and Undifferentiated Korean Hepatocellular Carcinoma*

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Department of Pathology, College of Medicine, Hanyang University, Seoul, Korea

**Background**

Recent outstanding studies have suggested SALL4, an oncofetal gene, as prognosis biomarker in hepatocellular carcinoma (HCC). Given the debates in study group difference in terms of etiologic factors between the Asian and Western HCC and immunostaining method, we tried to determine the prevalence of SALL4 immunoreactivity and its clinical relevance in Korean HCC patients.

**Methods**

We made tissue microarrays (TMAs) consisting of 213 surgically resected tissue of HCCs patients with germ cell tumor as an positive control group at the Hanyang University Hospital. SALL4 immunohistochemistry was scored in semiquantitative scoring system with immunoreactive score (IRS) and the results correlated with overall survival, in addition to general demographics and clinical characteristics.

**Results**

The average of patients’ age of our TMAs were approximately 55.39 years (range:15-87), 167 were men, and mean tumor size was 4.76cm (range:0.7-22). SALL4 immunoreactivity was expressed in 47cases. By univariate analysis, the SALL4-positive cases had significantly higher tumor grade (p=0.00). On the clinicopathologic analyses, correlations between SALL4 and clinicopathologic factors were not seen in microscopic and macroscopic vessel invasions, perineural invasions, AJCC stage, but SALL4 and alpha-fetoprotein (AFP) was correlated significantly. (P=0.005) The survival analysis showed :positive correlation with largest tumor size (p=0.005) and SALL4 immunoreactivity in T3 HCC was correlated with poor prognosis.

**Conclusions**

Here, we found that positive immunostaining of SALL4 is associated with poor patient survival outcome in the large and undifferentiated Korean hepatocellular carcinoma. SALL4 expression showed close relationship with clinical outcomes of HCCs in Korean patients. Further careful well designed study for SALL4 stem cell marker should be done with multinational studies for universal application of SALL4 as a biomarker for HCCs.

**Keywords:** SALL4, Hepatocellular Carcinoma
Laparoscopic Liver Resection for Hepatocellular Carcinoma in Cirrhotic Patients (Ten Years Single Center Experience)

Ahmed Shehta, Yoo Seok Yoon, Jai Young Cho, YoungRok Choi, Ho-Seong Han
Seoul National University Bundang Hospital

Background
Liver surgery in cirrhotic patients result in higher morbidity and mortality rates compared to non-cirrhotic patients. Recently, there is increased acceptance of laparoscopic approach in liver surgery. Recent studies showed that laparoscopic liver resection (LLR) is associated with reduced operative stress and postoperative complications. Therefore, laparoscopy should be more beneficial in cirrhotic patients. Few reports have evaluated LLR for hepatocellular carcinoma (HCC) in cirrhotic patients; however most of these reports are limited to easily accessible lesions. Also, few reported long term outcomes. The aim of this study is to evaluate our experience of LLR for HCC and compare perioperative and long term outcomes between patients with and without liver cirrhosis.

Methods
We retrospectively reviewed the data of the 232 patients who underwent LLR for HCC at SNUBH between January 2004 and December 2013. Patients were divided into 2 groups according to the presence or absence of histologically confirmed liver cirrhosis (LC).

Results
LC group had 141 patients and Non-LC group had 91 patients. Non-LC group showed larger tumor size (LC = 2.5 cm, non-LC = 3 cm, $p = 0.001$). More minor resections were done in LC group (LC = 124 (97.9%), non-LC = 71 (78%), $p = 0.011$). There were no significant differences between both groups regarding operation time, blood loss, transfusion requirements, and intraoperative complications. Non-LC group showed larger resection margin (LC = 0.8 cm, non-LC = 1.3 cm, $p = 0.019$). There were no significant differences between both groups in hospital stay, postoperative complications. Long-term oncologic outcomes were comparable between both groups regarding the recurrence rates ($p = 0.067$), overall survival rates ($p = 0.908$) and disease free survival rates ($p = 0.197$).

Conclusions
LLR is safe and feasible in patients with liver cirrhosis, with comparable results to non-cirrhotic patients.

Keywords: Laparoscopic Liver Resection, Hepatocellular Carcinoma, Liver Cirrhosis

Results of Neoadjuvant Hepatic Arterial Infusion Chemotherapy in Inoperable HCC Patients with Child-Pugh Class A

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Background
The prognosis of HCC patients with main portal vein tumor thrombosis (PVTT) or multiple intrahepatic lesions, or both is extremely poor and many surgeons regard them inoperable disease and also not suitable for liver transplant. We tried neoadjuvant hepatic arterial infusion chemotherapy (HAI) for them to improve their survival and convert operability.

Methods
Between April 2003 to March 2013, 46 inoperable HCC patients with Child-Pugh class A were treated with neoadjuvant HAI chemotherapy. HAI was performed via a port inserted through femoral artery. The patients were treated with 5-FU (750 mg/m²) and cisplatin (25 mg/m²) from

83
days 1 to 4. HAI was repeated every 4 weeks. We analysed the chemoresponse with RECIST (Response Evaluation Criteria In Solid Tumors) guidelines and survival rate. Cumulative survival was calculated using the Kaplan-Meier method and all statistical analyses were performed with SPSS software (version 12.0; SPSS, Inc., Chicago, IL).

Results

Twelve patients who could not receive more than 2 cycles HAI chemotherapy were excluded in this study. We analysed chemoresponse rate and survival in remaining 34 patients; overall CR, PR, SD and PD were 11.8% (four), 26.5% (nine), 47.1% (sixteen) and 14.7% (five), respectively. The median survival were 10.0 months. The 6, 12, 18 and 24-month cumulative survival rate 70.0%, 67.62%, 52.9% and 34.6%, respectively.

We could do liver surgery in 8 patients (17.3 %) and the median survival was 32.0 months. The 6, 12, 18 and 24-month cumulative survival rates were 87.5%, 65.6%, 65.6%, and 65.6%, respectively. Among of these patients, 3 patients live now and have no recurrence for 54 months, 51 months, 14 months, respectively. After 6 cycle, one patient who did not received surgery showed CR and survived 15 months without recurrence.

Conclusions

Neoadjuvant HAI chemotherapy can be another good option to treat inoperable HCC patients with good liver function.

Keywords: HCC, Hepatic Arterial Infusion Chemotherapy (HAI)

PE-18

Laparoscopic Anatomical Combined S3 & S4 Segmentectomy

Han Lim Choi, Ho-Seong Han

Seoul National University Bundang Hospital

Background

The extent of liver resection is better to be tailored according to patient’s status. Performing anatomic liver resection while preserving liver volume as much as possible, is the best strategy. This video shows the relevant technical methods of a laparoscopic combined anatomical segment 3(S3) and segment 4(S4) segmentectomy.

Patient and Methods

A 63-year-old woman had laparoscopic left hemicolectomy due to descending colon cancer. Three years after operation, 2.1 cm solid mass which was located in S4 and invading Glisson pedicles of S3 was found in a follow-up abdominal computed tomography. The possible preoperative diagnosis were liver metastasis, hepatocellular carcinoma and cholangiocarcinoma. The patient had hepatitis C viral hepatitis and was graded as child-pugh class A in liver function. Laparoscopic combined anatomical S3 and S4 segmentectomy was planned to preserve the remnant liver volume. Anatomical combined S3 and S4 resection was performed with selective Glissonian pedicle approach.

Result

The operation took about 290 minutes and the estimated intraoperative blood loss was approximately 400 ml; an intraoperative transfusion was not necessary. The final pathology confirmed a cholangiocarcinoma. On the 15th postoperative day, the patient was discharged without any postoperative complications.

Conclusion

A laparoscopic anatomical S3 and S4 combined segmentectomy is feasible for selected patients.

Keywords: Laparoscopic Surgery, Segmentectomy, Segment 3 and Segment 4
Primary hepatic carcinosarcoma, which includes both malignant epithelial (either hepatocellular or cholangiocellular) and mesenchymal elements, is extremely rare. A 65-year-old Korean woman was referred to our emergency center. She was complaining of right upper quadrant pain for two months & mild fever & chills. She had diagnosed hypertension 3 months ago and undergone right shoulder surgery due to trauma.

On physical examination, the abdomen was soft, without palpable mass, while with direct tenderness over the hepatic region.

Blood count on admission showed an elevated level of white blood cell count, 11.110³/µL; red blood cell count, 10.8 g/dL; platelets, 27410³/µL. Serological examinations on admission were total protein, 6.7 g/dL; albumin, 3.6 g/dL; total bilirubin, 0.8 mg/dL; aspartate aminotransferase, 107 IU/L; alanine aminotransferase, 65 IU/L; lactate dehydrogenase, 315 IU/L; glutamic-pyruvic transaminase, 103 IU/L. Serum level of carcinoembryonic antigen (CEA) was 1.0 ng/mL (normal range, < 1.0 ng/mL); serum level of α-fetoprotein (AFP) was 1.76 ng/mL (normal range, < 8.78 ng/mL); serum level of carbohydrate antigen 19-9 (CA19-9) was < 2.00 U/mL (normal range, < 37.0 U/mL). Serum markers for hepatitis B and C were negative. Human immunodeficiency virus (HIV) was negative. ICG (R15) was 10.6%.

Abdominal ultrasonography showed a 12 cm multiloculated cystic mass in right lobe of the liver suggesting cystic adenocarcinoma. Computed tomography (CT) revealed a huge tumor with definite enhancing soft tissue component outside the liver and amorphous high density material and internal septa enhancement, measuring 119.2 cm, mainly in the liver (S6) and a extrahepatic subcapsular soft tissue mass, measuring 3.61.9 cm, but also invading the right diaphragm. Magnetic resonance imaging (MRI) demonstrated that there are a complex cystic and solid mass in S6 and 7 and two metastatic nodules. Main mass had hemorrhagic component which is T1 high signal intensity. Positron emission tomography (PET) demonstrated cystic mass with heterogeneous hypermetabolism in right hepatic lobe and focal hypermetabolism in dome area of liver, suggesting seeded nodule or intrahepatic metastasis and hypermetabolic nodular lesion in subhepatic area.

She underwent right hemihepatectomy and partial resection of diaphragm. Pathologic report showed carcinosarcoma right lobe of the liver (cholangiocarcinoma and sarcoma). So we reported a case of primary carcinosarcoma of the right liver with literature review.

Keywords: Carcinosarcoma, Liver Neoplasm, Cholangiocarcinoma, Sarcoma

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**PE-20**

**Short-term Outcome of Laparoscopic Radiofrequency Ablation for Hepatocellular Carcinoma in Liver Cirrhosis:**

The Safety and Efficacy

Byung Gon Na, Gyu Sung Choi, Jong Man Kim, Choon Hyuck David Kwon, Jae Berm Park, Sung Joo Kim, Jae-Won Joh

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**Background**

Radiofrequency ablation (RFA) has been a legitimate treatment for primary and metastatic hepatocellular carcinoma (HCC) with liver cirrhosis. The laparoscopic RFA has replaced percutaneous RFA for HCCs because of poor sonic window, adjacent organ and major vessels. The aims of this study is to assess the clinical data and short-term outcome to evaluate efficacy and safety of laparoscopic RFA for HCCs with cirrhosis.

**Methods**

Between September 2009 to August 2014, 45 consecutive HCC patients with cirrhosis were treated by laparoscopic RFA. Most patients had hepatitis B (60%) and Child-Pugh class B status (90%). Median age was 60 years (range,
The short-term outcome was evaluated by radiologic images in 3-, 6-, and 9 months.

**Results**

Laparoscopic RFA was done in all patients and 49 HCC nodules was completely ablated. There was no procedure related morbidity and mortality. The HCC nodules consisted of primary (n=22), recurred (n=19) and metastatic lesions (n=8). Median nodule diameter was 17 mm (range, 8-40). The 19 (45%) nodules were located in segment 8. Median time of RFA was 14 minutes (range, 7-28), while total operative time was 130 minutes (range, 63-303). The combined procedure were adhesiolysis (n=17), cholecystectomy (n=2), colorectal surgery (n=1). The hospital stay was 5 days (range, 3-22). The 3-, 6-, and 9-months disease-free survival rate was 97.2%, 83.2%, and 78.6% respectively.

**Conclusions**

Laparoscopic RFA is a safe and effective therapeutic option for HCCs infeasible to percutaneous RFA in patients with cirrhosis. It is suggested that the laparoscopic RFA has the advantage of clinical outcomes comparable to those percutaneous RFA.

**Keywords** : Radiofrequency Ablation, Hepatocellular Carcinoma, Laparoscopy

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**Methods**

We dissected 41 cadaveric liver specimens in 2014 to study the fundamental structure of the caudate lobe, describe the arterial and portal blood supply, venous drainage and its bile duct, study the anatomical structure of the retrohepatic inferior vena cava and analyse the data.

**Results**

There are two arteries in Spiegel's lobe originated from the posterior branch of the right hepatic artery and/or left hepatic artery, the artery of caudate process originated from the posterior branch of the right hepatic artery. The portal blood supply of Spiegel's lobe originated nearly from the superior border of the left portal vein, and it of caudate process from the posterior branch of right portal vein or absence. It of paracaval are more changeful, generally, it originated nearly from the superior border of the left or right portal vein, occasionally from the anterior branch of right portal vein. In our study, we found the portal veins of the paracaval portion mainly from the right pedicle in 14 cases (34.15%), mainly from the left pedicle in 22 cases (53.66%), equally from the left and right pedicle in 5 cases (12.19%).

All of the vein of caudate lobe inflow into the inferior vena cava (IVC) from the anterior face and named short hepatic veins (SHVs), they often assume short extrahepatic vascular with thin wall, various amounts and locations. There are 5~12 SHVs normally. The bile duct of caudate lobe consist of left and right caudate duct, they often assume thin and short, and inflow into left and right hepatic duct, there are 2~5 caudate ducts normally. The bile ducts of caudate process inflow into right hepatic duct or posterior hepatic duct frequently.

The length of retrohepatic inferior vena cava is 5~10cm, there are 4~16 SHVs inflow into it from anterior face. There often be 1~2 thick veins outflow from segment VI and segment VII named inferior right hepatic vein (IRHV), and their diameter are 5~10mm. There is a clearance without short hepatic veins consisted of loose connective tissue between retrohepatic inferior vena cava and caudate lobe, there is an avascular zone without SHVs, its length is
45~97mm, and its width is 6~15mm.

Conclusions
The caudate lobe is an independent lobe with irregular shape, special anatomical location and complicated structure. Its characteristic piping system is highly variable, so it is difficult and dangerous if you are unfamiliar with its anatomical structure and common variation types. There is a clearance without short hepatic veins consisted of loose connective tissue between retrohepatic inferior vena cava and caudate lobe, we should pay more attention to it when caudate lobe resection, living donor liver transplantation, liver hanging maneuver and occlusion of hepatic blood inflow is performed.

Keywords: Caudate Lobe, Retrohepatic Inferior Vena Cava

Surgical Outcome of a Laparoscopic Major Liver Resection - A Large Volume Center's 10 years' Experience

Wontae Cho, Choon Hyuck David Kwon, Jin Yong Choi, Seung Hwan Lee, Byunggon Na, Dong Kyu Oh, Jong Man Kim, Gyu Seong Choi, Jae-Won Joh, Sung Joo Kim

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The application of laparoscopic liver resection (LLR) has had little progress since the first case was performed two decades because of technical difficulty of the operation, fear of gas embolism, potential massive bleeding, and possible inferior outcome in malignant diseases. This study reports the surgical outcome and how we can overcome difficulties of major LLR.

Between August 2004 and August 2014, a total of 569 patients of Samsung Medical Center were underwent LLR. Among this the major LLR was 226 cases. All major LLRs were intended totally laparoscopic and anatomical resection. We start to apply bipolar electro-cautery, temporary increase of intra-abdominal pressure (IAP), and Temporary Inflow Control of Glissonean pedicle (TICGL) method after 2012.

So we divided major liver resection into two groups, before and after 2012. Open conversion rate in major LLR was 29.7% (n=11) before 2012, and 6.9% (n=13) between 2012 and August, 2014. Open conversion rate and estimated blood loss decreased, but there were no statistical significance in operation time, and hospital stay between two periods. Postoperative complication rate of major LLR was 9.3% and bile leakage was most common complication (3.1%). Advance laparoscopic surgical technique induced the good result in approach for major liver resection. We are now in an era where major LLR is being accepted more widely and it has become important for institutions to have a good laparoscopic program.

Introduction
Unlike the widespread use of laparoscopic cholecystectomy after its introduction to the clinical practice, the application of laparoscopic liver resection (LLR) has had little progress since the first case was performed two decades ago. The slow acceptance of laparoscopic approach in liver resection is primarily due to the technical difficulty of the operation, fear of gas embolism, potential massive bleeding, and possible inferior outcome in malignant diseases. But, according to many effort and improvement of surgical technique LLR has rapidly come to be recognized as a procedure that can decrease morbidity and shorten the hospital length of stay. The results of randomized studies have led both surgeons and patients to regard laparoscopy as appropriate in the surgical treatment of various digestive diseases, including colon cancer. LLR also showed similar perioperative and long-term oncologic outcome when compared with open resection (OR) based on the case-controlled study. But major LLR is small number in almost studies and has been performing in a few experienced centers. There is scanty of data to evaluate the perioperative outcome of major LLR.

LLR was first started at 2004 in our center, and the cases are increasing year by year. Initial procedures has been
Table 1. Clinical characteristics of patients underwent laparoscopic liver resection

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Major hepatectomy (n=226)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age [years, median (range)]</td>
<td>54 (19 ~ 81)</td>
</tr>
<tr>
<td>Gender [male/female, n (%)]</td>
<td>140 (62%)/86 (38%)</td>
</tr>
<tr>
<td>Body mass index [Kg/m², median (range)]</td>
<td>22.4 (17.0 ~ 31.2)</td>
</tr>
<tr>
<td>Etiology</td>
<td></td>
</tr>
<tr>
<td>HCC</td>
<td>126 (55.7%)</td>
</tr>
<tr>
<td>Liver metastasis</td>
<td>22 (9.7%)</td>
</tr>
<tr>
<td>Benign tumor a</td>
<td>24 (10.6%)</td>
</tr>
<tr>
<td>Benign disease b</td>
<td>18 (7.9%)</td>
</tr>
<tr>
<td>Liver donor c</td>
<td>27 (11.9%)</td>
</tr>
<tr>
<td>Other malignancy</td>
<td>9 (3.9%)</td>
</tr>
</tbody>
</table>

a: benign tumor included follicular nodular hyperplasia, adenoma and cystadenoma. b: benign disease included intrahepatic stone and liver cyst. c: All donor hepatectomy were RH

Table 1: Clinical characteristics of patients underwent laparoscopic liver resection

The clinical characteristics of major LLR are shown in Table 1. Hepatocellular carcinoma (HCC) was most common cause of liver resection.

As in most centers from 2004 to 2011, LLR was mainly done for lesions for small tumors at the so called 'antero-lateral segments' (segment 2-6) requiring limited resection and most anatomic liver resections were primarily left lateral sectionectomies. Since 2012, major resections such as left or right hepatectomies and liver resections for lesions in difficult locations (segment 1, 7, 8) have been performed increasingly, up to half of the total cases (Figure 1). There were 37 major LLRs before 2012 and 189 cases between 2012 and August, 2014. The proportion of RH and LH was similar before 2012. RH was dominant and number of resection in difficult area increased after 2012 (Table 2). Open conversion rate in major LLR was 29.7% (n=11) before 2012, and 6.9% (n=13) between 2012 and August, 2014.

complications are classified by Calvien-Dindo classification. Biliary complication was classified by international study group of liver surgery (ISGLS) grading of bile leakage11).

Statistical analyses
Student t test and Fisher's exact test were used for comparisons among variables. Statistical significance was defined as p < 0.05. PASW Statics 18 was used for analysis.

Results
The clinical characteristics of major LLR are shown in Table 1. Hepatocellular carcinoma (HCC) was most common cause of liver resection.

As in most centers from 2004 to 2011, LLR was mainly done for lesions for small tumors at the so called ‘antero-lateral segments’ (segment 2-6) requiring limited resection and most anatomic liver resections were primarily left lateral sectionectomies. Since 2012, major resections such as left or right hepatectomies and liver resections for lesions in difficult locations (segment 1, 7, 8) have been performed increasingly, up to half of the total cases (Figure 1). There were 37 major LLRs before 2012 and 189 cases between 2012 and August, 2014. The proportion of RH and LH was similar before 2012. RH was dominant and number of resection in difficult area increased after 2012 (Table 2). Open conversion rate in major LLR was 29.7% (n=11) before 2012, and 6.9% (n=13) between 2012 and August, 2014.
Open conversion rate, estimated blood loss and transfusion rate decreased, but there were no statistical significance in operation time, and hospital stay between two periods. Most common cause of open conversion was hepatic vein injury (n=8, 3.5%) (Table 3).

Postoperative complication rate of major LLR was 9.3% and the complications were shown in table 4. Bile leakage was most common complication (3.1%). Among this, only one patient was needed re-operation, and 2 patients were needed percutaneous drainage. One of patients in portal vein thrombosis (PVT) was liver donor. The patient was decided re-operation, and open thrombectomy with portal vein repair were performed. A patient showed persistent increase of bilirubin and large amount of ascites after RH. The patient was chronic alcoholics and had large tumor (6.6cm in largest diameter), but pre-operative laboratory data was not specific (Child A, ICG15 : 10.0%, normal liver function test and coagulation pannel). We considered liver failure and recommended liver transplantation, but the patient was lost during follow-up. There was no mortality in perioperative period.

### Table 3. Operation time, estimated blood loss, hospital stay and open conversion rate of major liver resection

<table>
<thead>
<tr>
<th></th>
<th>~2011 (n=37)</th>
<th>2012- (n=189)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>OP time [mean(range)]</td>
<td>350 min (119 – 673)</td>
<td>386 min (132 – 832)</td>
<td>0.275</td>
</tr>
<tr>
<td>Blood loss [mean(range)]</td>
<td>64 mL (100 – 1000)</td>
<td>450 mL (50 – 2000)</td>
<td>0.062</td>
</tr>
<tr>
<td>Transfusion rate</td>
<td>3 (8.2%)</td>
<td>3 (1.6%)</td>
<td>0.057</td>
</tr>
<tr>
<td>Hospital stay [mean(range)]</td>
<td>9 days (5 – 34)</td>
<td>11 days (5 – 43)</td>
<td>0.341</td>
</tr>
<tr>
<td>Pringle maneuver</td>
<td>2 (5.4%)</td>
<td>23 (12.1%)</td>
<td></td>
</tr>
<tr>
<td>Pringle time [mean(range)]</td>
<td>40 min (20 – 60)</td>
<td>42 min (9 – 99)</td>
<td></td>
</tr>
<tr>
<td>Open conversion rate</td>
<td>11 (29.7%)</td>
<td>13 (6.9%)</td>
<td>0.004</td>
</tr>
<tr>
<td>Bleeding</td>
<td>7 (18.9%)</td>
<td>10 (5.3%)</td>
<td></td>
</tr>
<tr>
<td>Hepatic vein</td>
<td>2 (donor: 1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IVC</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Portal vein</td>
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<td></td>
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</tr>
<tr>
<td>Parenchyme</td>
<td>1</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Bile duct injury</td>
<td>1 (2.6%)</td>
<td>1 (0.5%)</td>
<td></td>
</tr>
<tr>
<td>Others*</td>
<td>3 (donor: 1)</td>
<td>2 (donor: 1)</td>
<td></td>
</tr>
</tbody>
</table>

* others included open conversion cases because of adhesion, failure of finding mass, huge mass, and for patient safety

### Conclusion

After 10 years experiences, LLR is now increasing and approaches to more difficult area. There was many effort to perform the advanced technique and reduced the gap between LLR and open liver resection.

The main innovations taken between 2011 and 2012 were the application of bipolar electro-cautery, temporary increased intra-abdominal pressure (up to 15 mmHg) and judicious using of Pringle maneuver during bleeding. These procedures maybe reduced the blood loss and open conversion rate. TICGL method facilitates more precise and safe liver parenchymal transaction. And this changes our laparoscopic program from minor resection to major resection and from left side lesion to right side lesion.

Hepatic vein injury was most common cause of open conversion in both periods of major LLR. Hepatic vein was easily injured by Ligasure™ which is mainly used in parenchymal transaction recently in our center, and difficult to control according to the site. So we used CUSA in deep
<table>
<thead>
<tr>
<th>Cause</th>
<th>n=21 (9.3%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bile leakage</td>
<td>21 (9.3%)</td>
</tr>
<tr>
<td>A</td>
<td>4 (1.7%)</td>
</tr>
<tr>
<td>B</td>
<td>2 (0.8%)</td>
</tr>
<tr>
<td>C</td>
<td>1 (0.4%)</td>
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<tr>
<td>Wound</td>
<td>4 (1.8%)</td>
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<td>Postoperative bleeding</td>
<td>2 (0.8%)</td>
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<tr>
<td>Portal vein thrombosis</td>
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<tr>
<td>Delirium</td>
<td>1 (0.4%)</td>
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<tr>
<td>Cerebral infarction</td>
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<tr>
<td>Stable angina</td>
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<tr>
<td>Acute kidney injury</td>
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<tr>
<td>Trigeminal neuralgia</td>
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<tr>
<td>Liver failure</td>
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</tr>
<tr>
<td>Clavien-Dindo classification</td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>2 (0.8%)</td>
</tr>
<tr>
<td>II</td>
<td>4 (1.7%)</td>
</tr>
<tr>
<td>IIIa</td>
<td>2 (0.8%)</td>
</tr>
<tr>
<td>IIIb</td>
<td>2 (0.8%)</td>
</tr>
<tr>
<td>IVa</td>
<td>4 (1.7%)</td>
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<td>IVb</td>
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<td>V</td>
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</table>

| \(^\text{1}\) | ISGLS classification of bile leakage; A: bile leakage requiring no or little change in patients’ clinical management; B: bile leakage requiring a change in patients’ clinical management (additional diagnostic or interventional procedure) but without relaparotomy; C: bile leakage requiring relaparotomy. \(^\text{2}\) | included other complications except biliary leakage |

Postoperative complications rate was quite lower than open resection reported. Patient selection by surgeon may produce this. But there are studies, which indicate that laparoscopy is associated with lower incidence of postoperative morbidity. Open conversion rate was similar, but intraoperative transfusion and complication rate were low comparing to other study of multicenter in Korea. Additional data comparing and analysis will be needed.

The mid-term positive results on the survival on patients receiving laparoscopic liver resection for malignant tumor induced increasing laparoscopic liver resection. Anatomical resections are important especially in HCC. In this and other studies anatomical resection obtained in high proportion, and the oncologic outcomes were within the range of those obtained by open resection and reported in recent series.

In conclusion, advanced laparoscopic surgical technique induced the good result in approach for major liver resection. We are now in an era where major LLR is being accepted more widely and it has become important for institutions to have a good laparoscopic program.

References


Keywords : Laparoscopic liver resection, major liver resection, surgical outcome

Transthoracic Thoracoscopic Metastasectomy for Subdiaphragmatic Metastases of HCC

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

Department of Surgery, Konyang University Hospital, Daejeon, Korea

Background
Post-operative recurrences are major determinants of survival for patients who have undergone curative resection of hepatocellular carcinoma. If the recurrent tumors located in segment VII and VIII or extrahepatic location, such as a subdiaphragm, a transthoracic transdiaphragmatic approach via thoracoscopy is feasible. Since the technique has the advantage of better intrathoracic exposure avoiding severe adhesiolysis, liver mobilization and possible hepatic congestion. We report a case of extrahepatic metastatic hepatocellular carcinoma that was successfully resected by transthoracic thoracoscopic metastasectomy.
Methods
A 68-year-old male patient who has undergone posterior sectinectomy with caudate lobectomy (S1,6,7) and cholecystectomy under a diagnosis of hepatocellular carcinoma at 3 years ago, was admitted to our hospital for further evaluation of extrahepatic metastatic tumor in right subphrenic space during the routine check-up. On liver dynamic computed tomography revealed a well-defined mass of 3.5 cm in diameter, in right subphrenic space with invading diaphragm and rt. adrenal gland. The imaging findings suggested an extrahepatic hepatocellular carcinoma that metastasized to the diaphragm. LFT was normal and AFP revealed 94.14 ng/ml.

Results
We performed transthoracic thoracoscopic metastasectomy for subdiaphragmatic metastases of HCC and partial diaphragmatic resection and repair. The operation time was 3 hour 30 minutes and blood loss was 100 ml. The patient started a diet POD 1 day and discharged POD 11days due to chest tube. The postoperative course was uneventful, and the patient was discharged without any complications.

Conclusions
Transthoracic thoracoscopic metastasectomy can be feasible even if the recurrent tumors located in segments VII and VIII or extrahepatic location, such as a diaphragm.

Keywords : Transthoracic Thoracoscopic Metastasectomy, Hepatocellular Carcinoma

Comparative Study of Totally Laparoscopic Liver Resection for Hepatocellular Carcinoma Between Anterolateral and Posterosuperior Lesions

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

Department of General Surgery, Seoul National University Bundang Hospital

Background
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.

Method
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.

Keywords : Laparoscopic liver resection, posterosuperior lesion, hepatocellular carcinoma
Comparative Analysis of Laparoscopic versus Open Surgical Radiofrequency Ablation for Malignant Liver Tumors

Kwangsik Chun, Insang Song
Department of Surgery
Chungnam National University Hospital

Objective
This study aims to evaluate the comparative effectiveness of the two surgical approaches on the treatment outcomes of radiofrequency ablation (RFA) for malignant liver tumors.

Patients and Method
Fifty-seven patients with malignant liver tumors, hepatocellular carcinoma, cholangiocarcinoma and liver metastases, were candidates for radiofrequency ablation underwent laparoscopic or open surgical approach.

Results
The patients' characteristics were comparable in the two groups, as were open (n=33, 57.9%) and laparoscopic (n=24, 42.1%) surgical approach. There were no statistically significant differences between the two groups in terms of recurrence rate (p=0.337) and overall survival (p=0.423). However, patients in the laparoscopic RFA group had significantly shorter hospital days (14.13 vs 5.89, p < 0.05) and experience less complications. (Grade I, 62.5% vs 26.3%, p = 0.102)

Conclusion
Laparoscopic RFA can be performed for malignant liver tumors with lower morbidity rates, less invasiveness and expense comparative to open surgical approach.

Keywords: Laparoscopic RFA

Laparoscopic Liver Resection; The Initial Experience of a Small Volume Single Center in Korea

Doo Jin Kim, Jang Yong Jeon, Joo Seop Kim
Hallym University Medical Center

Background
Laparoscopic surgery using minimally invasive techniques potentially brings benefits to patients who need liver resection for HCC and other intrahepatic tumor. The purpose of this study was to report the results of laparoscopic liver resection and detail the lessons from the early experiences of a single center.

Methods
Between July 2009 and June 2014, a total of 20 patients underwent laparoscopic liver resection. Clinical and radiologic data were reviewed retrospectively. This cohort study with 5-year results of total laparoscopic hepatectomy for intrahepatic tumor including HCC was conducted in one center. Patients were selected for laparoscopic liver resection by the same team based on the 2008 international laparoscopic liver resection consensus: mainly include favorable indication and exclude relative contraindication. The operation also was performed by one team of surgeons. The follow-up protocol was similar to that for open surgery. The data for the patients were collected and analyzed using SPSS software.

Results
During study period, 20 enrolled patients with 14 HCC and 6 other intrahepatic tumors underwent laparoscopic liver resection. The male-to-female ratio was 1.1:1. The mean age of the patients was 58.3 years (range 46-71 years). The follow-up period for 20 patients was 21.5 ± 15.0 months (range 0-60 months). The mean tumor size was 2.62 cm (range 0.8-6 cm). The pathologic categorizations were as follows: HCC (70%), benign tumor (15%), CCC (10%) and
metastatic tumor (5%). None of patients were required open conversion. The types of resection were 13 tumorectomy of one segment (segments 2, 3, 4, 5, 6, 7, and 8; 65%), 5 lateral sectionectomy (25%), and 2 left hepatectomy (10%). The median free resection margin of malignant tumor was 1.5 cm (range 0.2-3). The mean operation time was 297 ± 58 min (range 140-600 min). The mean hospital stay was 8.68 days (range, 5-19 days). No perioperative mortality occurred. The disease-free survival rates of malignant tumor were 75 % at 1 year, 60 % at 3 years, 50. % at 5 years.

Conclusions
The results of laparoscopic hepatic resection for favorable indicated patient in the current series are comparable to previous studies. A successful laparoscopic hepatectomy program can be established in a single small-volume institute. Laparoscopic liver resection is a promising treatment option with minimally invasive benefits for indicated patients.

Keywords : Laparoscopic Hepatectomy

PE-27

Associating Liver Partition and Portal Vein Ligation for Staged Hepatectomy (ALPPS) in Advance Hepatocellular Carcinoma
Chih-Chi Wang, Yi-Chai Chan, Yu-Ju Tseng, Wei-Feng Li, Ting-Lung Lin, Chih-Che Lin, Shih-Ho Wang, Chee-Chien Yong, Yu-Hung Lin, Chao-Long Chen
Kaohsiung Chang Gung Memorial Hospital
We report a case of advanced hepatocellular carcinoma (HCC) with risk of post-hepatectomy liver failure resulting from insufficient remnant liver volume treated successfully by associating liver partition and portal vein ligation for staged hepatectomy (ALPPS). A 73-year-old male with chronic hepatitis B related liver disease was diagnosed of HCC in Feb. 2014. Computed tomography (CT) demonstrated 2 tumors in S4a and S8 of liver (3.5 cm and 7.0 cm in diameter respectively). The level of a-fetoprotein was 2893ng/mL. Initially, transarterial embolization was arranged with incomplete response. The right trisegmentectomy was planned but future liver remnant (FLR) was 368ml (37.3%), which might carry post-operative risk of liver failure. The first step operation included portal vein ligation and in-situ splitting of the liver. Ten days later, the volume of left lateral segment has increased to 485ml (48% of FLR), then completion surgery was performed. The post-operative recovery was uneventful and patient was discharged on the 11th day after second operation. At 4-month after surgery, this patient is alive without tumor recurrence. Our finding suggest that ALPPS is a safe and feasible procedure in patient with chronic liver disease, and induce a marked and rapid hypertrophy of the left lateral liver, which provide a therapeutic option for patient with advanced liver tumors.

Keywords : Hepatocellular Carcinoma, ALPPS

PE-28

Treatment of Single Nodular Recurrent HCC: Repeat Hepatectomy or Not?
Masaki Ueno, Manabu Kawai, Seiko Hirono, Shinya Hayami, Syunsuke Yamaguchi, Kenichi Okada, Hiroki Yamaue
Second Department of Surgery, Wakayama Medical University Hospital

Background and aim
How to manage the recurrent tumors is an important issue in order to achieve long term survival in treating hepatocellular carcinoma (HCC). We aimed in this study to compare prognostic outcomes among repeat hepatectomy (RH), radio-frequency thermal ablation (RFA), and trans- arterial chemo-embolization (TACE) when recurrent HCC was single.

Methods
Retrospectively 82 single nodular recurrent HCC patients
Poster Exhibition

were reviewed. All of them received either RH (n=19), RFA (n=41), or TACE (n=22). Recurrent free interval after second treatment, patterns of re-recursive lesion, and overall survival were surveyed.

Results
Median recurrent free interval of RH, RFA, and TACE were 24.4, 23.3, and 17.4 months (P=0.55). Tumor status and Child-Pugh score at initial treatment were not significantly different among them. Median tumor size at recurrence of RFA was 1.2cm and smaller than the other groups (P<0.01). Local or disseminative recurrent patterns after second treatment were observed in 9 patients of the RFA group, 5 patients of the TACE group, and in the RH group (P=0.02). Five-year survival rates after initial treatment of RH, RFA, and TACE were 88, 65, and 57% (P<0.01). Multivariate analyses for overall survival showed that TNM-stage I/II at initial treatment, early recurrence within 24 months, and RFA or TACE treatment at recurrence were independent prognostic factors. Their odds [95% confidence interval] were 3.0[1.5-6.9], 2.8[1.4-5.6], 2.9[1.1-8.0], and 4.2[1.5-11.6], respectively.

Conclusions
At first recurrence, selecting treatment modalities might affect overall prognosis when the recurrent lesion was single.

Keywords : HCC, Recurrence, Surgery, RFA, TACE

The Meaning of the Gross Type in Aspect of Cytokeratin 19 Positivity and Resection Margin in Patients with Hepatocellular Carcinoma Underwent Liver Resection

Sang Hyun An1, Sung Hoon Kim1, Moon Young Kim2, Mee-Yon Cho3, Soon Koo Baik2

1Department of Surgery, 2Internal medicine, 3Pathology, Yonsei University Wonju College of Medicine, Wonju Severance Christian Hospital, Wonju, Gangwon-do, Korea

Background
There is no consensus about safe resection margin in patients with hepatocellular carcinoma who underwent surgical resection. Surgeon decides the extent of resection according to the residual liver function and tumor location. We investigated the impact of resection margin in aspect of the tumor gross type and cytokeratin 19 (CK 19) positivity.

Methods
We retrospectively reviewed the medical record of patients who underwent liver resection on Wonju Severance Christian hospital. We divided the patients into two groups as following; group 1 included expanding and vaguely nodular types and group 2 included nodular with perinodular extension, multinodular confluent and infiltrative types. We divided resection margin into narrow (0.1-1cm) and wide (more than 1.1cm). We compared the clinicopathological features and CK19 positivity.

Results
Clinical and operative characteristics did not showed difference between group 1 and group 2. However, group 2 had higher prevalence of gross portal vein invasion (PVI), microscopic PVI, microvessel invasion, satellite nodule, intrahepatic metastasis, multicentric occurrence and positivity of CK 19. Group 1 showed no difference of recurrence according to the resection margin. However, Group 2 showed higher recurrence rate in patients with narrow resection margin than that in patients with wide resection margin (p=0.043). Patients with CK 19 positivity in group 2 showed higher prevalence of PVI (p=0.012) and microvessel invasion (p=0.009).

Conclusions
Although our study has a limitation of small case number, patients with hepatocellular carcinoma showing expanding and vaguely nodular gross types may undergo safely surgical resection with narrow resection margin.

Keywords : Hepatocellular Carcinoma, Gross Type, Resection Margin, Cytokeratin 19
A Propensity Score-Matched Case-Control Comparative Study of Laparoscopic and Open Liver Resection for Hepatocellular Carcinoma

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

Departments of Surgery, Keimyung University School of Medicine, Dongsan Medical Center

**Background**

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 postoperative 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.

**Keywords:** Hepatocellular Carcinoma, Laparoscopy

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Laparoscopic Liver Resection for T1 and T2 Stage Hepatocellular Carcinoma versus Open Hepatectomy - Propensity Score Analysis

Sanghyun Song¹, Choon Hyuck David Kwon², Sanghoon Lee², Jong Man Kim², Jae-Won Joh, M.D.²

¹Dankook University Hospital, Dankook University College of Medicine, ²Samsung Medical Center, Sungkyunkwan University School of Medicine

**Background**

To investigate the relevance of laparoscopic hepatectomy for the treatment of early stage hepatocellular carcinoma (HCC) compared with conventional open hepatectomy.

**Methods**

From January 2008 to February 2011, 74 laparoscopic hepatectomy cases were selected for the laparoscopic resection group including 6 open conversion cases. The conventional open hepatectomy group included 377 cases. Propensity score matching was performed according to TNM stage, microvascular invasion, Edmondson grade, tumor size and operation range. For 1:2 matching, 148 conventional open hepatectomy patients were elected for the open resection group. Retrospectively, 222 cases were compared.

**Results**

Both groups presented with similar blood loss. The operation time was slightly longer in the laparoscopic resection group, and tumor safety margin was larger than that of the open
resection group (19.2 mm vs. 11.6 mm, p<0.001). Patients in the laparoscopic resection group had shorter hospitalization (9.2 days vs. 12.7 days, p=0.007). Postoperative morbidity was higher in the open resection group. There were no significant differences in disease-free survival and overall survival for either laparoscopic surgery or open surgery.

Conclusions
Laparoscopic liver resection is feasible and an oncologically adequate procedure for T1 and T2 stage hepatocellular carcinoma located in anterolateral section.

Keywords: Laparoscopic Hepatectomy, Hepatocellular Carcinoma

Surgical Outcome of Laparoscopic Liver Resection in Developing Country
Unenbat Gurbadam
National Cancer Center of Mongolia

Background
The need of liver surgery in Mongolia is vast; subsequently Hepato Cellular Carcinoma (HCC) incidence in Mongolia is six times greater than world average and representing 44.2% of all new cancer in Mongolia. The early HCC’s or small sized liver cancers are relatively rare and that influence for selection criteria of laparoscopic surgery in our center.

Introduction
Since Dr. Enkh-Amgalan successfully performed the first laparoscopic liver resection of Mongolia in 2010 in our center, we performed sixty cases of LLR including malignant and benign lesion. The aim of this study is to analyze our data’s and create enhancements on our outcome and to share developing countries experience of laparoscopic liver resection with limited instruments and access.

Method
From September 2009 to June 2014 there were malignant and benign total sixty cases of laparoscopic liver resection are performed and database of single center study is retrospectively collected and analyzed by SPSS-21.

Result
There were 28(46.7%) male and 32(53.3%) female patients. Laparoscopic wedge resection was n=29, laparoscopic left lateral sectionectomy was n=29, laparoscopic anatomical segmentectomy III was n=1 and laparoscopic left hepatectomy was n=1. The mean age of patients was 59 (range 29-78). There were 51 patients with hepatocellular carcinoma (HCC), among them 22 patients had liver cirrhosis (Child-Pugh A, n=18, Child-Pugh B, n=4), Hepatitis “C” virus was n=26, hepatitis “B” virus was n=16, and hepatitis B and C viral co-infection was n=5. The mean tumor size of the resected tumor was 3.5 cm (range 1-10), the 10 cm sized tumor was echinococcus hydatid cyst located in sII/III, half of the tumor was almost extra-hepatic and underwent left lateral sectionectomy. Most of the wedge-resected tumors were superficial and anterio-lateralis positioned (<1.5 cm from the liver surface). The mean operation time was 138 min (range 45-390min). The mean blood loss was 140 ml (range 30-2000ml). The mean hospital stay was 8.5 days (range 2-29 days).

Discussion
Partial resection of the peripheral liver or a left-lateral segment resection is more feasible for laparoscopic approach, because the periphery of the liver is devoid of large venous structures and bleeding can be easily controlled with clamps or cautery. In every open liver surgery we uses IOUS to determine the intrahepatic metastasis presence and mostly the hepatic veins for resection line. With the limitation of instruments we could not perform the IOUS in laparoscopic surgery such us we frequently perform in open surgery, but near future we will have laparoscopic transducer. For the best parenchymal dissection system as we experienced is the Cavitron Ultrasonic Surgical Aspirator (CUSA) allows selective fragmentation and aspiration of collagen-sparse tissues such as liver parenchyma. Blood vessels and bile ducts are preserved. In early experience of left lateral sectionectomies we used an open CUSA dissectron hand by mini laparotomy. For bloodless surgery, the vessel sealing
instruments such as LigaSure from (Valley lab) and Harmonic scalpel from (Ethicon) are most important instruments. The most common perioperative complications are bleeding and bile leakage. Bleeding from major hepatic vein is more difficult to control during laparoscopy and often leads to conversion to open surgery. We performed only one laparoscopic left hepatectomy by glissonean approach and it is not sufficient to expand our criteria for major hepatectomy but as we already mentioned in above the absence of particular instruments limits us to go for laparoscopic major hepatectomies.

Conclusion
The patients with small tumors, located in the left lateral segments or in the anterior-lateral segments of the right liver, laparoscopic resection are feasible and safe in resources limited countries such as Mongolia. At least 1-cm free surgical margin should be routinely obtained.

To expand our criteria for laparoscopic major hepatectomy such as left hepatectomy or right hepatectomy we need more experience on laparoscopic hilar dissection and particular instruments as laparoscopic CUSA dissector, laparoscopic ultrasound transducer and specially a well trained multidisciplinary team including surgical nurses and technicians.

Keywords : Laparoscopic Liver Surgery, Liver Resection, Laparoscopic Hepatectomy

<table>
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<tr>
<th>Liver segments by Couinaud's classification</th>
<th>Hepatocellular carcinoma (n=51)</th>
<th>Benign tumor (n=8)</th>
<th>Liver metastasis (n=1)</th>
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<td>-</td>
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<td>Stage III</td>
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Table 2. Status of liver cirrhosis in HCC patients (n=51)

<table>
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<tr>
<th>Liver cirrhosis</th>
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<th>Child Pugh C</th>
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<tbody>
<tr>
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<tr>
<td>Non-cirrhotic liver</td>
<td>29</td>
<td>16</td>
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Viral hepatitis

<table>
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<tr>
<td>B</td>
<td>16</td>
</tr>
<tr>
<td>C</td>
<td>26</td>
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<td>B and C</td>
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Without viral hepatitis (n=4)

Total HCC patients 51

Table 3. Patient demographic and operational data

<table>
<thead>
<tr>
<th>Mean (Std. Deviation)</th>
<th>Range</th>
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<tbody>
<tr>
<td>Age (y)</td>
<td>59.4±11.27</td>
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<tr>
<td>Tumor size (cm)</td>
<td>3.5±1.97</td>
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<tr>
<td>Blood loss (ml)</td>
<td>139.5±277.8</td>
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<tr>
<td>Duration (min)</td>
<td>138.2±65.9</td>
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<td>Hospital stay (day)</td>
<td>8.5±4.9</td>
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</tbody>
</table>

PE-33

Intraoperative Radiofrequency Ablation and Peritoneal Lavage with Distilled Water for Spontaneously Ruptured Hepatocellular Carcinoma

Ho Joong Choi. Young Chul Yoon

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Objective
To introduce a simple and theoretically safe method; Intraoperative RFA and peritoneal lavage with distilled water for spontaneously ruptured HCC

Background
Spontaneous rupture of hepatocellular carcinoma (HCC) is a rare but life threatening complication by causing a hemoperitoneum and worse prognosis. Prognosis of patients with ruptured HCC has not been fully evaluated.

Method
Data of 4 consecutive patients who underwent intraoperative radiofrequency ablation and peritoneal lavage with distilled water for spontaneously ruptured HCC was evaluated.
Patients with ruptured HCC that accompany neither distant metastasis nor existence of tumor thrombus at PV or HV were targeted. Bleeding control was performed by gently packing gauzes on the cancer lesion and applying ablation with RFA probe at corresponding site. Blood transfusion was also applied at the same time. Depending on the consequences, resection was done if needed. After the operation, lavage with 10L of distilled water was followed for 20 minutes to prevent tumor seeding.

**Result**

Between Jan. 2012 and Oct. 2012, 4 patients were operated using RFA on ruptured HCC. Among these, 3 patients had hepatitis B related LC and the other was alcoholic LC. 1 patient ended the operation after RFA only and 3 patients went through partial hepatectomy in addition to bleeding control with RFA. Amount of intraoperative PRC transfusion was 37 units for RFA + Rt. Hepatectomy, 2 unit and 7 unit for RFA + Lt. lateral sectionectomy (LLS) patients, respectively and 7 unit for RFA only patient. Average length of hospital days in ICU was 5.5 days and average hospital days in general ward were 22 days. 6 month survival rate for all patients were 100% but 1 patient died of lung metastasis, 7 months after the operation. All patient had no peritoneal metastasis.

**Conclusion**

Intraoperative RFA and peritoneal lavage with distilled water for spontaneously ruptured HCC is easy to perform and theoretically safe method, although further study is needed after accumulation of more cases

**Keywords**: Hepatocellular Carcinoma, Spontaneous Rupture, Radiofrequency Ablation, Peritoneal Lavage, Distilled Water

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**Surgical Tactics for Acute Cholecystitis and Choledocholithiasis with Obstructive Jaundice Complications for Elderly and Senium Patients**

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MUS with PEJ «City Hospital №1» Department of Surgery.

There was retrospective treatment analysis conducted for 736 elderly and senium patients with destructive cholecystitis and choledocholithiasis. The diagnostics involved ultrasonography, RCPT, patients preparing procedure for the operative remedial in intensive care unit conditions. The staged remedial was preferable, using endoscopic minimally invasive technologies on the first stage. ERCPT, EPST and lithoextraction was performed on 72.4% of the patients, percutaneous trans-hepatic microcholecystotomy under ultrasonic monitoring- 18,5 %, laparoscopic cholecystectomy- 5,3%, opened cholecystectomy- 4,1%. Surgical intervention was performed within the second stage. 64,5 % of the patients underwent cholecystectomy with short-scar incision. The developed tactics established improvements in the treatment results and lower the amount of complications down to 4,6%, lethality - to 1,1 %.

**Introduction**

For the last decades the number of patients with acute calculous cholecystitis and related complications has been increasing. Post-operative lethality rate still remains on the high level, amounting to 1,5-12%. Lethality after emergency surgery for acute cholecystitis is even higher, for the elderly - 15-20%. At the same time delayed surgery performed after the elimination of acute inflammation can reduce postoperative lethality to 1.0%. The widespread introduction of minimally invasive methods into clinical practice such as endoscopic papilosfinkterotomiya (EPST), laparoscopic cholecystectomy (LCE), Cholecystectomy with minimal access (MCE), radically changed the surgical techniques.

**Objective**

Developing treatment tactics for elderly and senium patients with destructive cholecystitis and choledocholithiasis basing on the results of retrospective treatment analysis for 10 years period.

**Materials and Methods**

For 10 years, there were 9037 patients hospitalized patients
with acute cholecystitis. 6431 (71.1%) patients underwent operations. Postoperative lethality was on 0.7-2.4% level (average 1.19%). 1108 (17.2%) patients were diagnosed with destructive cholecystitis and choledocholithiasis complicated by obstructive jaundice. There were 1108 (17.2%) patients of elderly and senium age. Analysis of the study group patients involved using clinical- morphological classification of acute cholecystitis, as proposed in 1986 by V.S. Savelyev. Elderly patients (60-74 years, according to WHO criteria) amounted to 442 (60.1%), whereat 80 (10.9%) were male patients and 362 (49.2%) - female. Elderly patients amounted to 294 (39.9%), whereat 22 (3%) were male, and 272 (36.9%) - female. Thus, elderly and senium women represented the vast majority, which complies with the literature data.

Selecting a diagnostic algorithm was based on the necessity to define treatment strategy based on related diseases. Timely implementation of this requirement allowed adequate using of the complex examination on patients, where instrumental methods were a preferable choice of surgical tactics (x-ray radiography, ultrasonography, EGDS, ERCPT, EPST, CT etc.).

The disease period of these patients had specific characteristics. 597 (81.1%) patients, both women and men, had pain in the right hypochondrium with irradiation to the right shoulder blade preceding to the development of the obstructive jaundice. At the same time, 123 (16.7%) patients had pain and obstructive jaundice simultaneously, and 10 (1.4%) patients developed obstructive jaundice without pain, but it was accompanied by a pronounced inflammatory response and hyperthermia.

The duration of the clinical symptoms of the disease varied from a few hours to 5 days. Associated disease was detected for the majority of patients of elderly and senium age. Disease of the cardiovascular system was detected for 265 (60%) of the elderly patients and 243 (82.7%) of the senium patients, respiratory system - in 72 (16.3%) and 118 (40.1%) cases correspondingly, diabetes mellitus - 134 (30.3%) and 41 (13.9%), acute pancreatitis - 42 (9.5%) and 3 (1%), chronic pyelonephritis - 18 (4%) and 8 (2.7%) patients. The anamnesis abdominal surgery was performed on 24 (5.4%) elderly patients and 6 (2%) senium patients. Thus, vascular heart diseases, diabetes, respiratory system diseases prevailed. 57 (7.7%) patients with calculi in the common bile duct (CBD) revealed of major duodenal papilla (BP) stenosis, 16 (2.1%) patients were diagnosed with parapapillary diverticulum, 215 (29.2%) - gallbladder empyema. Paracystic abscess was diagnosed to 58 (7.9%) patients, paravesical infiltration - 274 (37.2%), all patients had obstructive jaundice, but 79 (10.7%) patients had it as a background disease, after the episode of pain in the right hypochondrium. Signs of cholangitis were observed in 151 (20.5%) cases and prevailed for senium patients. 114 (15.5%) patients had a history of surgery on the pelvic organs.

Results and Discussion

All invasive procedures performed are divided depending on the duration of their after admission. Emergency surgery was performed on patients with destructive cholecystitis, obstructive jaundice, and peritonitis at different times of the day in terms of up to 3h after hospitalization necessary for preoperative preparation. It was a small group of 12 (2.7%) elderly patients. There was traditional cholecystectomy, choledocholithotomy, drainage CBD on Kher. There were no lethal cases.

Urgent surgery was performed while maintaining the build-up or signs of destructive changes of the abdominal cavity, and endotoxemia during 24-48 h after admission, usually in the daytime. In septic cholangitis clinically observed increase in endotoxemia (Charcot's triad, pentad of Reynolds), and surgery was performed within 1 day. There were 8 of them (2.2%) - elderly women. 1 case was lethal.

Delayed surgery was performed on patients within 3 to 10 days after admission, when an urgent operation was not required. A number of observations required emergency surgery, but patients rejected it for various reasons. After that, due to the deterioration of their disease, they underwent surgery. Such operations were not considered delayed because signs of destructive cholecystitis remained for 8-10
days for 50% of the patients.
Treatment of 736 patients with destructive cholecystitis and choledocholithiasis complicated by obstructive jaundice, among whom were 442 (60.1%) patients of elderly and 294 (39.9%) senium patients, was carried out in several stages. Typically, the first stage sought to create conditions for the outflow of bile using ERCPT, EPST and sanitation of common hepatic duct (CHD) and CBD. Also, in order to reduce the bile hypertension there was cholecystostomy performed. ERCPT, EPST and lithoextraction were conducted on 320 (72.4%) of elderly patients and 190 (64.6%) senium. ERCPT EPST and executed in 10 (2.3%) and 8 (2.7%) patients. Percutaneous transhepatic micro cholecystostomy (CHCMHS) under ultrasonic monitoring was performed on 59 (13.3%) and 77 (26.1%) patients, laparoscopic cholecystostomy - 38 (8.6%) and 11 (3.7%), opened cholecystostomy 10 (2.3%) and 20 (6.8%) patients.
In a number of cases, performing endoscopic observation was impossible. Cardiopulmonary failure was the cause of failure of endoscopic sanitation CBD in 50 (11.3%) of elderly patients and 35 (11.9%) - senium parapapillary diverticulum - 6 (1.4%) and 8 (2.7%) patients. Large calculus was detected in 16 (3.6%) elderly cases and 11 (3.7%) senium, wedged in BP - in 7 (1.6%) and 8 (2.7%), abdominal surgery and KDP anamnesis - 24 (5.4%) and 6 (2%) patients, respectively. In such situations, the gallbladder drainage was performed in different ways.
PTBD under ultrasonic supervision was performed under local anesthetizing. It was recommended for: decompensated heart-related lung disease, sufficient overview of the target organ by ultrasound, perivesical infiltration operations on the upper abdomen in the anamnesis. This operation was performed on 136 (18.5%) patients, 79 (17.9%) elderly patients and 77 (26.2%) senium.
Laparoscopic cholecystostomy was performed on 51 (6.9%) patients, the majority of the involved patient were elderly - 38 (8.6%). The indications for this type of surgery was considered the clinical signs of acute pancreatitis, the lack of an overview of the target organ by ultrasound. At the same time, there was a significant number of contraindications, difficult to treat. Destructive cholecystitis, perivesical abscess and local peritonitis were identified in 23 (5.2%) elderly cases and 28 (9.5%) senium, surgery on the organs of the upper abdomen in history was performed on 25 (5.6%) and 5 (1.7%), inability inspection target-organ by ultrasound - 27 (6.1%) and 17 (5.8%) patients, respectively.
Typically, laparoscopic cholecystostomy was performed under local anesthesia. This group consisted of 27 (3.6%) patients with acute calculous cholecystitis phlegmonous, 20 (2.7%) patients with acute biliary pancreatitis, 4 (0.5%) patients with empyema of the gallbladder. All patients with acute pancreatitis of biliary etiology were further drained in the peritoneal cavity for the programmed rehabilitation and control of enzymatic and enzymatic toxemia peritonitis.
Open cholecystostomy was performed on 30 (4.1%) patients, senium prevailed - 20 (6.8%). It was recommended due to severity of the abovementioned procedures, as well as the life-long recommendation, if open cholecystostomy was the final surgery. This group included 3 (1.0%) senium patients.
The second stage - delayed surgery. Traditional cholecystectomy was performed on 250 (33.9%) patients, whereat drainage CBD on Kher - 68 (27.2%). MCE was performed in 475 (64.5%) cases, LCE - in 4 (0.5%).
The use of minimally invasive interventions in the complex treatment of patients in this group was the main objective, which is justified by the severity of their initial state. Firstly, it is possible to dispense surgical aggression: first performed minimal intervention aimed at eliminating obstruction as CBD, and the reduction of inflammatory changes in the gallbladder and obstructive space (the first stage). The second stage began when there was improvement of the patient's condition due to the elimination or reduction of jaundice, cholangitis, and improve of the function of the liver, which was especially important in the reviewed group patients with a high degree of operational and anesthetic risk.
The second stage was commonly performed in a delayed period. We consider it necessary to look at the advantages and disadvantages of different types of surgery in patients of
elderly and senile age.

LCE was performed on 4 (0.9%) elderly patients. This operation for elderly and senile age is associated with a number of characteristics related to the creation of pneumoperitoneum. High pressure in the abdominal cavity leads to a "squeezing" of blood from the abdominal cavity organs and the inferior vena cava to the heart, which in terms of heart diseases may cause congestive heart failure and type of hypodynamic circulation, especially for patients with an initial hypovolemia. Laparoscopic operations note hypercapnia, which is a consequence carboxyperitoneum and absorption of carbon dioxide from the abdominal cavity, which is well diffused through the peritoneum and dissolves in blood. All LCE were performed under endotracheal anesthesia with diprivan under total intravenous anesthesia. There was used a mode of moderate hyperventilation, which avoids hypercapnia and acidosis.

There were no complications of anesthesia in the postoperative period in the form of hard-correctable hypertension or prolonged mechanical ventilation.

MCE was performed on 475 (64.5%) patients - 289 (65.4%) elderly patients and 186 (63.3%) senile. All procedures were performed under local anesthesia - spinal and epidural. The apparent advantage of this surgery for patients who are burdened with cardiopulmonary failure with previous surgical interventions on the upper abdominal cavity was regional anesthesia when endotracheal anesthesia and carboxyperitoneum were undesirable. Of course, the positive effect of this operation was due to the previously made EPST for 565 (76.8%) patients and PTBD under ultrasound monitoring for 136 (18.5%) patients, 49 (6.6%) laparoscopic and 30 (4%) open cholecystostomy.

52 (6.9%) patients, where it was impossible eliminate biliary hypertension due to the above-mentioned reasons with endoscopic means, intervention to CBD, such as drainage and choledocholithotomy CBD were made during the MCE. It should be noted, that the MCE was commonly carried out in a delayed period, after decrease inflammation.

TCE was performed on 250 (33.9%) patients - 132 (29.9%) of elderly and 118 (40.1%) senium. In the majority of cases - 182 (72.8%) patients - TCE did not require intervention to CBD, as there was previously successfully completed EPST. The remaining 68 (27.2%) patients completed choledochotomy, lithoextraction and Kher drainage. TCE in the majority of cases was performed within 3 days after EPST, when it was not possible to eliminate destructive cholecystitis, despite the previously performed on 22 (2.8%) patients PTBD and 8 (1%) - open cholecystostomy.

Evaluating the effectiveness of each method of surgical treatment of patients with destructive cholecystitis and choledocholithiasis complicated by obstructive jaundice in elderly and senile patients, we carefully took into account the duration of hospital stay, postoperative period, as well as the amount, the nature of intra-and postoperative complications. This material was fully presented in the previously published work [2].

Analysis of the postoperative complications and lethality should be noted as predictably evolving. With operations on 736 patients, there were 8 deaths (1.1%). The main reason was the severe endotoxemia on the background of multiple organ failure, destructive cholecystitis and obstructive jaundice. In 5 (0.6%) patients prevailed heart system failure. 2 patients died, respectively, from the pancreatic necrosis and septic shock.

Postoperative complications were observed in 34 (4.6%) of the cases - in 10 (2.2%) elderly and in 24 (8.1%) senium. Cardio - vascular failure that required treatment in a cardiac intensive care unit, was detected in 8 (1.1%) patients, an abscess subhepatic space - 3 (0.4%) patients, gastrointestinal bleeding was noted in 2 (0.3%) cases. Bile leakage was observed in 4 (0.5%) patients, bleeding from the gallbladder bed - in 2 (0.3%). Empyema of surgical wounds was found in 8 (1%) cases after TCE.

Conclusion
The rate of destructive cholecystitis and choledocholithiasis with obstructive jaundice complication for elderly and senium patients is 8.1%. In view of the rate and severity of the related diseases, such patients require special treatment in
order to find diagnosis and remedial scheme. It is urgent to fully use minimally invasive radial and endoscopic diagnostic methods (ultrasonography, ERCPT). Patients’ preparation to the surgical intervention shall be conducted in intensive care unit conditions.

A staged remedial is preferable. On the first stage, it is primary to use endoscopic minimally invasive interventions (ERCPT, EPST, lithoextraction). In case, when using endoscopic technology is not usable, drainage minimally invasive methods shall be used in order to decrease bile hypertension (PTMBD under ultrasonic monitoring or laparoscopy, opened cholecystostomy). The second stage is delayed radical minimally invasive surgical interventions (LCE, MCE). Traditional surgical bile and extrahepatic bile passages interventions should be performed only if endoscopic and minimally invasive interventions are impossible to perform due to general or special contraindications.

Keywords: Acute Cholecystitis, Choledocholithiasis

References
studies during postoperative evaluation of a rising carcinoembryonic antigen (CEA) level for colon cancer.

**Methods**

An asymptomatic 66-year-old man was found to have a single low-density mass in the spleen by abdominal computed tomography (CT) in Feb 2007. He had previously undergone left hemicolectomy for a moderately-differentiated adenocarcinoma of the descending colon in May 2001. The tumor invaded up to the subserosal layer (T3) with no lymph node metastasis. No distant metastasis was found at the time of surgery. The patient was regularly followed up, having abdomen CT and CEA. In Mar 2007, splenic mass was discovered by abdomen CT. At laparotomy, no recurrence was identified except for a huge sized mass 17 x 14 cm in the spleen. Invasion to the surrounding organs or lymphadenopathy was absent. Macroscopically, the tumor was solitary, yellowish, clearly demarcated by a thin capsule. Microscopically, the tumor was an adenocarcinoma, consistent with metastasis from the previously resected descending colon cancer.

**Results**

The postoperative course was uneventful. The patient was discharged on the 12th day. On one year later, perigastric and perirectal metastatic nodules was identified on CT.

**Conclusion**

It is generally accepted that splenic metastasis of colorectal cancer is uncommon and usually occurs in association with other extensive metastasis. Therefore, curatively resectable isolated splenic metastasis is rare. It is recommended that clinicians pay close attention to the spleen for the early diagnosis of isolated metastasis when routinely evaluating patients with serial CEA levels and abdominal scans following curative resection of primary colorectal carcinoma. Splenectomy seems to be justified in the absence of systemic recurrences since it is an operation with low operative morbidity and may provide potential for long-term survival.

**Keywords:** Metachronous, Spleen, Colon

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**PE-36**

**FundiS First Technique in Empyema Gall Bladder in an Obese Patient**

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**Background**

The 2 main challenges of laparoscopic cholecystectomy are primary peritoneal access and safe identification, ligation, and division of the cystic duct and cystic artery \(^1\). Many times we have to convert it into open. Even in open surgical techniques, sometimes we face difficulties in identification of common bile duct, cystic duct and artery due to massive adhesions. So we have to proceed from the fundus of the gall bladder. In our case report we came across with similar situation where due to thick and massive adhesions we have to proceed from the fundus first.

**Methods**

Patient was a 28 years old lady with repeated attacks of Ac. Cholecystitis over a period of 14 days. She had Body Mass index of 30. Her liver functions tests were normal. White cells counts were 14000/cmm. Ultrasound was showing 1.5 cm stone impacted in the neck of the gall bladder. It was decided to start the surgery by open technique. On opening the abdomen, Omentum was found to be encasing the gall bladder from fundus till common bile duct. Omentum was separated from the gall bladder and then callots triangle was not possible to identify. All the surgery was done by fundus first technique and cholecystectomy done.

**Results**

In difficult situation when there is difficulty in identification of cystic duct, common bile duct and cystic artery. It is quite useful to proceed from fundus of the Gall bladder and whole gall bladder can be separated from its bed.

**Conclusions**

The operator should always keep in mind that to avoid any damage to the cystic duct and common bile duct, we should
start from the fundus of the gall bladder right from the beginning. By the technique like the one we have just mentioned it will help in preventing the injuries of common bile duct.

**Keywords**: Fundus, Adhesions

**Expression of Bile Acid Receptor TGR 5 in Gallbladder Cancer**

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**Background**

TGR 5 is a plasma membrane bound, G-protein coupled receptor for bile acids. It has been detected in a various tissues, especially in biliary tree. There have been some reports that TGR 5 expression is related with the development of cancer however, almost all of it was for knockout mice. In this study, we determined the relationship between the strength of TGR 5 expression and gallbladder cancer.

**Methods**

We retrospectively reviewed the medical records and immunohistochemistry assessment of 30 patients who underwent radical cholecystectomy for gallbladder cancer at our hospital between July 2004 and April 2013. And then, we compared it to the patients who underwent cholecystectomy for benign gallbladder disease, such as gallbladder stone or benign polyps. We analyzed the staining pattern and strength for TGR 5 as intensity and extent, then we categorized it as three groups: weak, moderate and strong staining.

**Results**

The overall strength of TGR 5 staining was significantly higher in the gallbladder cancer group ($p = 0.001$). In gallbladder cancer group, strong TGR 5 staining was present in 50% and weak staining was only in 6.7%. However, in benign gallbladder disease group, weak TGR 5 staining was observed in 25.9% and strong staining was only in 18.5% ($p = 0.002$). There was no significant differentiation between the strength of TGR 5 expression and cancer cell differentiation ($p = 0.309$).

**Conclusions**

We concluded that TGR 5 is much more expressed in gallbladder cancer than normal gallbladder mucosa. However, we did not found any relationship between TGR 5 expression and cancer cell differentiation in this study.

**Keywords**: TGR 5, gallbladder Cancer, Gallbladder, Immunohistochemistry

**Extrahepatic Bile Duct Cancer Involving Middle Bile Duct has Worse Prognosis than Cancer Confined to Intrapancreatic Bile Duct**

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Keimyung University Dongsan Medical Center

**Background**

The aim of this study was to evaluate the prognosis and optimal surgical procedure for middle bile duct(BD) cancer.

**Methods**

Curative resection of extrahepatic BD cancer was performed in 90 patients. They were classified into three groups according to the location of tumors: DISTAL(n=32), tumor was confined to the intrapancreatic bile duct; MID(n=20), tumor was located between below the confluence of the hepatic duct bifurcation and suprapancreatic portion of the BD; and DIFFUSE(n=38), tumor was located diffusely.

**Results**

Tumor involving the middle BD(MID or DIFFUSE group) had a higher rate of perineural invasion as compared to the DISTAL group. The overall and disease-free survival rate for
the MID and DIFFUSE group was significantly worse than that of DISTAL. In the MID/DIFFUSE group, there was no significant difference of survival according to the type of the operation (pancreaticoduodenectomy or segmental BD resection). The multivariate analysis showed that tumor involving middle BD and node metastasis were independently poor prognostic factors for disease-free and overall survival.

**Conclusion**
Tumors involving the middle BD has a worse prognosis than those confined to the intrapancreatic BD. In patients with tumors confined to the middle BD, BD resection can be an alternative surgical procedure to pancreaticoduodenectomy, if an R0 resection can be accomplished.

**Keywords:** Extrahepatic Bile Duct Cancer

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**Incidentally Confirmed Gallbladder Cancer After Cholecystectomy; Single Center Experience**

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**Introduction**
Gallbladder (GB) cancer is the disease of the serious mortality rate, with a 5-year survival rate as low as 10–50%. In as many as 50% of cases, GB cancers are detected at pathologic report after cholecystectomy for benign GB disease. This study described that incidentally detected gallbladder cancer after cholecystectomy in single center.

**Materials**
In Gangneung Asan Hospital, Gangneung, Korea, out of 4629 cholecystectomy surgeries performed from 1998, January to 2014, March. In their cases, 73(1.57%) cases were confirmed GB cancer by pathologic analysis. We excluded 17 cases because of other causes, analyzed 56 cases for clinical features, disease free survival (DFS), overall survival (OS) and risk factor of incidental GB cancer.

**Results**
In 56 patients’ clinical features, mean age is 67.91±11.86, 23(41.1%) cases are male and 33(58.9%) cases are female. Preoperative symptomatic patients are 37(66.1%), Preoperative diagnosis are variable. 17(30.4%) cases are symptomatic GB stone, 16(28.6%) cases are acute cholecystitis, 14(25%) are GB polyp, 1(1.8%) case is GB stone which combined polyp, 8(14.3%) cases are other disease. GB perforation during operation is a risk factor of DFS (p=0.041), but is not risk factor of OS (p=0.074). All patients of T1a (n=8), T1b (n=4) are alive and free of disease after only cholecystectomy. Patients of T2 (n=37) and T3 (n=7) had been performed variable operation, but DFS and OS are no difference by operation (p>0.05). In multivariable analysis, old age (>65), lymph node metastasis, poor differentiation of tumor, and positive lymphovascular invasion are risk factor of DFS and OS (p<0.05).

**Conclusion**
Sometimes, GB cancer is incidentally detected on pathologic analysis after cholecystectomy. If possible, it is important that no perforation of GB, during cholecystectomy. If GB cancer is detected after cholecystectomy, additionally appropriate operation should be performed according to the stage.

**Keywords:** Incidental Gallbladder Cancer, Cholecystectomy

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**Ruptured Large Intrahepatic Subcapsular Hematoma after Laparoscopic Cholecystectomy**

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The development of large subcapsular hematoma after laparoscopic cholecystectomy (LC) is an infrequent complication and rarely reported. Fourteen cases have been published with different etiologies including use of NSAID's like Ketololac during and after surgery, hemangiomas or small iatrogenic lesions aggravated by administration of ketorolac and coagulation dysfunction like circulating heparin as seen in hematological disease. We report a case of a patient undergoing LC developed severe complication of a ruptured large intrahepatic subcapsular hematoma. A 35 year old woman was admitted because of symptomatic gall stones with obstructive jaundice. MRCP showed papillary bulging and enhancement due to passed stones, multiple gallstones with wall thickening of gallbladder. Because of severe abdominal pain, she was administered 30mg of ketorolac intravenously at the previous day of surgery. She underwent LC using three trocars. The dissection of the gallbladder from the liver bed was accomplished easily. There was no notable event during surgery. She was administered 30mg of ketorolac by 8 hours for a day. After 48 hours, the patient had an episode of RUQ pain. Blood test showed hemoglobin of 6.6 g/dl. CT was checked and showed multifocal active bleeding from the surface of the right lobe of liver, resulting in subcapsular hematoma and moderate degree of hemoperitoneum. She underwent exploratory laparotomy and we found a massive subcapsular hematoma of right liver and hemoperitoneum. No iatrogenic lesions were found. Gallbladder bed did not show any lesions. The hematoma was evacuated and we performed bleeding control of hepatic surface with argon laser. After the operation, she recovered uneventfully. Follow-up CT was performed 7 days after surgery and it revealed no evidence of active bleeding. She was discharged on postoperative 22 days, and returned to previous social activity. The presence of an subcapsular liver hematoma after a LC is a extremely rare complication. About the management: if the patient is stable, the hematoma can be observed or drained percutaneously with ultrasound guidance, and if unstable laparotomy is mandatory.

Keywords: Hematoma, Laparoscopy, Cholecystectomy

Outcome of pT2 Gallbladder Cancer According to Management of Regional Lymphadenectomy

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Purpose
To analyze of outcome of pT2 gallbladder cancer (GBC) and clarify its effect on long term survival according method of lymphadenectomy

Method
eighty patients with GBC who underwent sampling or radical lymphadenectomy from 2001 to 2012 were retrospectively analyzed. The patients were divided into two groups according to type of lymphadenectomy (sampling lymphadenectomy with liver wedge resection vs. radical cholecystectomy) in each T stage. We defined as sampling lymphadenectomy when were retrieved No. 12 lymph node or enlarged hilar lymph node. Forty seven of 80 patients had pT2 lesion. We divided four groups according to lymph node metastasis (LN (+/-)) and type of lymphadenectomy (LND): group A was LN (-) and sampling LND; group B was LN (-) and radical LND; group C was LN (+) and sampling LND; group D was LN (+) and radical LND

Result
Mean age was 74.6 years old (+9.4). Male and female were 38 and 42 of 80 patients (M : F=1:1.52). Mean follow up months was 32.5 months. Mean survival month of all patients was 32.6 months (+ 35.3 months). 5 year survival rate of this cohort was 36.5 %. Two and 5 years survival rate according to pT stage (T1a, T1b, T2, T3 and T4) were 100%, 86%, 52%, 20%, 0% and 100%, 72%, 37%, 0%, 1%, respectively. In pT2 lesion, there was statistically difference between group A and B (p=0.001), however did not show statistically
significance between groups C and D in survival.

**Conclusion**

When there was the lymph node metastasis, it showed poor prognosis regardless of type of lymphadenectomy. So, in order to predict the exact patient's prognosis, the radical lymphadenectomy is essential.

**Keywords**: T2 GB Cancer, Lymph Node Dissection

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**Outcomes after Cholecystectomy in Patients with Diabetes: A Nationwide Study**

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\(^2\)Department of Anesthesiology, Taipei Medical University Hospital, Taipei, Taiwan

**Background**

Outcomes after cholecystectomy in patients with diabetes are not completely understood. This study evaluated the association between diabetes and adverse outcomes after cholecystectomy.

**Methods**

With the use of reimbursement claims from the Taiwan National Health Insurance system, we performed a population-based cohort study of 151,123 patients with and without diabetes undergoing cholecystectomy between 2004 and 2010. The odds ratios (ORs) and 95% confidence intervals (CIs) of postoperative complications and mortality associated with preoperative diabetes were calculated in the multivariate logistic regressions after adjusted for sociodemographics and coexisting medical conditions.

**Results**

Compared with 128022 surgical patients without diabetes, those with preoperative diabetes had increased risks of septicemia (OR 1.31, 95% CI 1.25-1.38), pneumonia (OR 1.17, 95% CI 1.07-1.28), stroke (OR 1.21, 95% CI 1.10-1.33), acute myocardial infarction (OR 1.48, 95% CI 1.14-1.90), acute renal failure (OR 1.47, 95% CI 1.30-1.66), and urinary tract infection (OR 1.48, 95% CI 1.38-1.57) after cholecystectomy.

**Conclusion**

Patients with diabetes had increased complications after cholecystectomy. In particular, those with diabetes-related clinical indicators had higher mortality after cholecystectomy.

**Keywords**: Cholecystectomy, Diabetes, Adverse Outcomes

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**Ultrasonography Diagnosis and Minimally Invasive Treatment Methods for Complications of Liver and Biliary Diseases in Early Post-Operative Period**

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There was analysis conducted for ultrasonography results of 237 patients, who underwent liver or biliary surgical intervention. 111 patients had different post-operation
complications found. Minimal invasive endermic interventions with ultrasonography supervision were performed on 75 (67.6%) with limited fluids accumulation and infiltrate in the abdominal cavity. The ultrasonography showed no signs of complications in post-operative period and the most significant signs of intra-abdominal complications. The ultrasonography results allow developing treatment tactics for patients and choosing the method of surgery intervention.

Introduction
For the last decade, development of liver and biliary surgery has been expanding in the range of surgery interventions, complexity of methods and techniques used by surgeons during the operation. However, despite the intense growth in number of operations and surgery methodical advancements, the post-operative complications frequency remains on the high level. The range of ultrasonography use for diagnosis of various disease is wide, but it is not used enough for post-operative period and post-operative complications diagnosis. Ultrasonography also has some advantages compared to other radiological methods: absence of radiation exposure, fast receiving of data on abdominal cavity condition during post-operative period, point-of-care procedure performance, ability to conduct multiple tests and case monitoring, possible additional invasive diagnostics, combination of diagnostic and remedial actions.

Objective
Review of the dynamic ultrasonography results and minimally invasive endermic treatment controlled by radiological methods during early post-operative period for patients who had underwent different liver and biliary interventions.

Materials and Methods
There was conducted diagnostics and treatment of 111 patients, who had different abdominal complications found after liver and biliary surgical interventions. Apart from the main group of patients, ultrasonography results of 216 patients were analyzed who underwent similar surgical interventions with non-complicated post-operation period. Post-surgery abdominal cavity review of patients was performed by ultrasonography convex probe with 3.5Mhz frequency. The monitoring began on the next day after the surgery and during the entire period of patient’s hospital stay. Non-complicated post-operation period had ultrasonography performed on the 1st, 3rd, 5th and 7th days of post-operative period, i.e. once every 2 days within 1 week. In case of any complications found, ultrasonography was on daily basis. Post-operational complications were found in 125 cases. Intra-abdominal hemorrhage was diagnosed in 5 cases, peritonitis- in 7 cases. 9 patients had hematoma, 47- abscess, isolated bile accumulation- 7 cases, infiltrate- 6. Reactive pleuritis was diagnosed for 38 monitored patients, 6 patients had pancreatitis, pancreatonecrosis, phlegmon of extraperitoneal cellular tissue. Standard abdominal cavity ultrasonography methods were used on patients. Endermic minimally invasive interventions monitored by means of ultrasonography and radioscopy were performed using 2-7 mm diameter catheters, and Ivshin exchangeable catheters, Amplatzer dilatators to set larger drain. After endermic intervention, control fistulography was performed to specify the size and shape of the drained cavity.

Results and Discussion
There were infiltrative-inflammatory changes found in liver parenchyma of the resected area in cases of non-complicated post-operation period. All 43 patients had the following changes shown by ultrasonography: hyperechogenicity of liver parenchyma, structural discontinuity, roughness and blurring outline. Thereat were also found numerous hyperechogenic structures of different shapes with acoustic shadow and reverberation effect from metal seals and threads.

Changes in biliary bed after its resection depended on the performed hemostasis method. Laparoscopic and traditional cholecystectomy (TCE) most commonly use biliary bed treatment technique with electrothermal stimulation and creating coagulation necrosis of the adjoining liver parenchyma. The typical ultrasonic image in that case was as follows: oblique scanning of the right hypochondriac region or through the intercostal space showed discontinuous
hyperechoic oval- or pear-shaped structure with even and sharp outline. 74 (70.5%) patients had such characteristics during 14 days after the surgery. Different image could be observed after suturing the biliary bed. There was hypoechoic zone of irregular shape with rough and blurring outline, discontinuous structure. 31 (29.5%) patient had such ultrasonic symptoms during the early post-operative period after the traditional cholecystectomy. They remained for a significant amount of time- 3-4 weeks. Apart from the abovementioned changes in liver resection area, removed cyst area or resected biliary bed, there is space which will be filled with neighboring anatomic structures, such as greater omentum fold, little gut loop, segmented intestine, gaster, which can be clearly observed by ultrasonography. Ultrasonography after the papillotomy and formation of biliodigestive anastomose showed the following changes in the passages system: absence of the expansion intra- and extrahepatic bile passages, blurred external and inner outline, inhomogeneity of passage lumen, aerobilia. The most prominent ultrasonic sign of peritonitis during the after-operation period was deposition of the intestine fluids and its prevailing over pneumatosis. Due to the mentioned changes, there was an obvious expansion of the intestine loops diameter and its enlargement during a certain period. Peristaltic movements were rare or absent. There were found free fluids, infiltration of abdominal cellular space in the abdominal cavity, shown by increased echogenicity and heterogeneity. Ultrasonography did not show free gas in the abdominal cavity in normal conditions. Its presence is the sign of acute surgical disease. Pneumoperitonium is a common symptom within 4-5 days of normal postoperative period. Thus, free gas found after 5 days after the operation was a sign of invalid biliodigestive anastomose. The largest group was 69 (62.2%) patients with postoperative infiltrate, abscess and fluid located in different places of the abdominal cavity. Accumulated fluid was a criterion for puncture diagnosis under ultrasonic monitoring. Before performing the minimally invasive intervention, it was important to choose a safe point of access according to the ultrasonography results and in view of changes in the abdominal cavity after the surgery. 20 patients of the group had a located fluid accumulation under the right and left hemidiaphragm. Apart from the main ultrasonic signs of abdominal cavity abscess of any location, there were signs of subdiaphragmic fluid accumulations, such as reactive hydrothorax of the affected side, high diaphragm cupula position and its movement restriction. The group of patients with fluid accumulation under the diaphragm underwent 20 minimally invasive puncture interventions monitored with ultrasonography and radioscopy. 41 patient had a limited fluid accumulation and infiltrate under the liver, whereas 39 patients had underwent cholecystectomy. Those patients underwent 46 minimally invasive interventions. Formation of the located fluid accumulation under the liver in 4 of the cases led to obstructive jaundice, cholangitis, passage disturbance through the dodecadactylon. In 5 of the cases, there were combined measures taken, including external drainage of bile passages monitored with ultrasonography and radioscopy. 4 of the patients had limited fluid accumulation in the liver parenchyma. They underwent trans-hepatic drainage. 6 patients after RCPT and EPST had located necrosis found in pancreatic head with developing and in 2 cases there was phlegmon of extraperitoneal cellular tissue. In view of this, different drainage operations were performed.

Conclusion

Success of the surgical interventions is mostly due to the specific post-operative monitoring of the patients. Dynamic monitoring by ultrasonography allows finding signs of non-complicated post-operative period and the most significant ultrasonic symptoms of complications. In case of finding a complication during the post-operative period, ultrasonography allows to choose the relevant access for endemic minimally invasive intervention. The choice of safe puncture trajectory in the area of interest along with ultrasonography data establishes a significantly lower amount of complications and, thus, increased puncture and drainage efficiency.
Keywords: Complications, Ultrasonography

References

Primary Leiomyosarcoma of the Pancreas:
Laparoscopic Distal Pancreatecto-splenectomy

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Introduction
Most of the malignant tumors of the pancreas are adenocarcinomas arising from the ductal epithelium. Although a primary pancreatic leiomyosarcoma is the most common sarcoma of the pancreas, it is rare and accounts for only 0.1% of malignant pancreatic cancers. Pancreatic leiomyosarcoma is a highly aggressive malignancy that spreads in a similar manner to gastric leiomyosarcoma, i.e., by adjacent organ invasion, hematogenous spread, and lymph node metastasis. These tumors are large at the time of diagnosis and are usually found at an advanced stage.

Methods
We report a case of a 58-year-old female with intermittent left upper quadrant abdominal discomfort. Radiological, histopathological, and immunohistochemical studies revealed the tumor to be a primary leiomyosarcoma of the pancreas. Herein, we describe a patient with a primary leiomyosarcoma of the pancreas who presented with clinical and radiological findings indicative of a mass in the pancreatic body & tail. The patient underwent laparoscopic distal pancreatecto-splenectomy.

Results
The operative findings showed no evidence of a mass originating from any other adjacent organs. Macroscopically, the yellowish 10 x 8 cm firm tumor was seen to be located in the pancreatic body and tail with invasion into mesocolon. The surgical margins were negative histopathologically. Microscopically, the tumor consisted of uniform-sized spindle cells with slight eosinophilic cytoplasm and showed moderate cellularity and nuclear atypia. Frequent mitotic
activity was seen with up to twenty two mitosis per ten high-power field (HPF). There are areas of degenerative and focal necrosis within the lesion. Immunohistochemically, tumor cells were positive for CD34, α-smooth muscle actin (α-SMA), and vimentin, while S-100, cytokeratin, and CD117 were negative. Thus, the tumor was diagnosed as pancreatic leiomyosarcoma with high-grade malignancy. The patient had an uneventful postoperative course and has shown no evidence of local recurrence or distant metastasis during 10 months of follow up.

Discussion
Primary leiomyosarcoma of the pancreas is extremely rare. Complete surgical resection offers the only potential chance of cure for patients with a leiomyosarcoma of the pancreas. Histologically, the present tumor showed aggressive features of high cellularity, pleomorphism, and a substantial number of mitoses. The safety and efficacy of laparoscopic approach for primary pancreatic leiomyosarcoma should be evaluated.

Keywords : Laparoscopy, Leiomyosarcoma

Natural Course of Intra-abdominal Fluid Collections Following Minimally Invasive Left Sided Pancreatectomy

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Background
Intra-abdominal fluid collections (IFC) at operative bed were frequently founded after minimally invasive left sided pancreatectomy. However, natural course of IFC following minimally invasive left sided pancreatectomy have not been evaluated thoroughly yet.

Methods
From July 2006 to May 2011, seventy-four patients underwent minimally invasive left sided pancreatectomy for benign or malignant pancreatic lesions by single surgeon. All patients were performed abdominal CT scan routinely after operation for identification of complications. The patients with IFC were followed up by CT scan regularly to complete resolution. We measured the size of IFC in abdominal CT scan each time.

Results
Among 74 patients underwent minimally invasive left sided pancreatectomy, IFC were developed in 70 patients (94.6%). IFC have resolved gradually in all cases except 5 cases lost of follow-up before complete resolution (median time: 27 weeks, range: 8-204 weeks). 67 patients were asymptomatic and 3 patients presenting symptom consistent with local peritonitis were performed intervention procedure (percutaneous catheter insertion, gastrocystostomy by endoscopy). In resolution analysis using Kaplan-Meier survival analysis, 50% of IFC were resolved within 27 weeks after operation. Malignant pancreatic lesion showed significantly shorter resolution time than benign in sub-group analysis (p=0.005).

Conclusions
IFC were developed in most cases following minimally invasive left sided pancreatectomy. Most of IFC were asymptomatic and disappeared spontaneously without intervention.

Keywords : Intra-abdominal Fluid Collections, Natural Course, Minimally Invasive Surgery, Left Sided Pancreatectomy

Hepatic Artery Anastomosis Using Two Kinds of Artificial Prosthesis in Deceased Donor Liver Transplantation

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Background

Failure of hepatic artery anastomosis such as stenosis or thrombosis in liver transplantation could make a fatal complications and graft failure. Especially, weak and incomplete hepatic artery from repetitive transhepatic arterial chemoembolization caused failure of hepatic artery anastomosis. If hepatic artery was not available for hepatic anastomosis, an iliac arterial interposition graft would be a best option for deceased donor liver transplantation but other proper methods were not established.

We reported a case of successful hepatic artery anastomosis using two kinds of artificial prostheses in deceased donor liver transplantation.

Case Report

A 42-year-old female patient was admitted due to vomiting and mental deterioration. Her mother has hepatitis B but she had not checked the viral markers. Her laboratory values was worsen that PT INR value was increased to 2.36 and total bilirubin level was 7.03. AST and ALT was marked increased 13412 and 7246 IU/L. Hbs antigen was positive and antibody was negative. HBV DNA TaqMan(copy) was 1.87 * 10^8 copies/mL. On abdomen CT, liver was mildly shrinked and moderate amount of ascites was identified. Acute on chronic liver failure was diagnosed. During admission, she was aggravated and PT INR was increased to 7.05 although fresh frozen plasma was administered continuously. Ascites could not be controlled and large volume paracentesis was developed. She was registered to status IIA on KONOS.

Deceased donor liver transplantation was performed. Her donor was a 54 year old male brain death patient due to cerebrovascular accident. Donor liver was 1500g in weight and vascular structures were normal. Her natural liver was severe shrinked and weight was 500g. Her hepatic artery became narrow and common hepatic artery diameter was 1mm sized. Fish-mouth of division at proper hepatic artery and gastrohepatic artery was too weak and hepatic artery flow was not persistent. Jump artificial graft anastomosis was urgently planned because cadaveric iliac artery graft was not available. Two artificial prostheses were used that ringed Gore-tex™(6mm sized) and tapered expended PTFE prostheses(Taperflo™, 4mm to 6mm). End to side anastomosis between gore-tex nad infrarenal aorta, end-to-end anastomosis between Gore-tex™ and Taperflo™, and serial end to end anastomosis between Taperflo™ and hepatic artery were performed. Artery anastomosis duration was too delayed and after reperfusion, liver multifocal ischemic areas were identified. She was recovered slowly but totally on postoperative course and discharged on postoperative 62 days. On postoperative 3 months, hepatic artery flow and feature of liver was good on CT and duplex US.

Conclusions

Hepatic artery anastomosis using two kinds of artificial prosthesis such as that ringed Gore-tex™ and Taperflo™ was successful in deceased donor liver transplantation. It would be a good option possible for unavailable anastomosis between recipient natural hepatic artery and donor hepatic artery.

Keywords : Artificial Prosthesis, Liver Transplantation
type of their incisions as conventional incision as inverted L incision (n=214, C group), upper midline incision (n=110, M group) and transverse incision using laparoscopy (n=12, T group). Demographics, clinical outcomes of donor and recipient and patient satisfaction of cosmetic appearance using a questionnaire were compared. In demographics, mean age was younger (p = 0.000), female ratio was higher (p = 0.000) and BMI was lower (p = 0.025) in M group and T group than C group. Mean operation time was shorter in M group (260.9 ± 43.5 min) and longer in T group (340.0 ± 65.1 min) than C group (275.1 ± 45.5, min) (p = 0.000). There was no significant difference in postoperative morbidity and mortality of donor and recipient among three groups. Donor satisfaction using questionnaire showed more satisfactory of body image, cosmetic view and self-confidence in M group and T group than C group. Sense of dullness or numbness on scar was more prominent in C group (40.0%) and T group (100%) than M group (13%) (p = 0.010). In conclusion minimal incision is technically feasible and safe for donor hepatectomy and it also achieved higher patient satisfaction levels from improved cosmetic outcomes than conventional incision.

**Keywords**: Donor Hepatectomy, Incision Methods

**PE-48**

**Identification of Unknown Bile Duct Injury in the Right Liver Graft and Adequate Anastomosis Method to Overcome Delayed Biliary Complication: A Case Report**

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Different anatomical variations of the intrahepatic bile ducts, and in particular its right half, is one of the important risk factors for biliary complication in recipients undergoing living-donor liver transplantation (LDLT). The authors already reported high risk group of biliary injury during living donor hepatectomy according to the anatomy of the right posterior bile duct (RPBD). We experienced a case with the bile duct injury in the graft which was unnoticed during living donor hepatectomy. 26 years old male underwent right liver hepatectomy for donation to his father 55 years old. The preoperative MRCP showed long caudal segment of RPBD, which has been reported as high risk for biliary complication in the recipient. There was no problem during donor hepatectomy and bench surgery. However, we found that RPBD was not easily identified and RPBD was partially ligated when probing was tried just before biliary anastomosis. We opened ligated RPBD. But the wall was thin. We opened damaged wall of RPBD and duct-to-duct anastomosis was done without stent. According to this case, we learned several lessons: 1) Understanding of the preoperative risk of bile duct injury during hepatectomy based on preoperative MRCP is important, 2) different bile duct division method in the high risk patient should be applied, 3) comparison of the biliary anatomy by probing the graft during bench with that of preoperative MRCP is necessary to detect unknown bile duct injury, 4) injured wall should be opened and anastomosed using healthy duct is important to reduce delayed biliary complications.

**Keywords**: Bile Duct, Liver Transplantation, Posterior Bile Duct

**PE-49**

**Outcome and Technical Aspects of Liver Retransplantation: Analysis of a 25-Year Experience in a Single Major Center**

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Introduction
Liver retransplantation (re-LT) is only option for irreversible graft failure and the need of re-LT has been increasing in transplant era. We introduce the outcome and technical aspects of re-LT during 25 years in our center.

Methods
We retrospectively reviewed patients who underwent LT between March 1988 and February 2013.

Results
Among 1,312 LT during 25 years, 2.9% were re-LT (n=38). Adult was 28 patients (mean 52 years), and child was 10 (mean 5.7 years). Most common indication was primary nonfunction in early re-LT and biliary complication in late re-LT. Preoperative major co-morbidity was very common (81.6%) and infection was most frequent (52.6%). Living donor re-LT comprised 21.1%. In operative technique, nonconventional methods were substantially performed: high hilar dissection for hepatectomy (>50%), arterial anastomosis using right gastroepiploic or jump graft (23.7%), hepaticoenterostomy (60.5%). Several times of anastomosis was needed in 10.5% for artery and 5.3% for duct. In adult and child, mean estimated blood loss was 9,541 mL and 977 mL, and operative time was 508 and 432 minutes, respectively. Inhospital mortality was 35.7% in adult and 40.0% in child, and the main cause of death was sepsis in both. Survival rate at 1 month, 1-, 3- and 5-years were 89.4%, 56.5%, 50.3% and 50.3% in adult, and 70.0%, 60.0%, 60.0% and 60% in child.

Conclusions
Outcome of re-LT is poorer than primary LT regardless of the cause of graft failure, and more technical concerns are needed. We need more efforts to control of perioperative infection and to improve the survival after re-LT.

Keywords: re-LT, Liver Transplantation, Outcome

Tips and Pitfalls of Intraoperative Direct Spleno-renal Shunt Ligation at Liver Transplantation

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Background
The patient with big spleno-renal shunt (SRS) with or without severe organizing thrombus in the main portal vein (PV) is challenging. Portal vein thrombectomy is not enough to overcome this situation because of poor portal flow. Renal vein ligation is one of the methods to increase portal flow without risk of shunt rupture during shunt isolation. However, direct SRS ligation can be safely performed to solve this problem.

Methods
We introduced the clinical outcome of 16 patients who received intraoperative direct SRS ligation. Among 580 recipients from Jan. 2010 to Jun. 2013, 16 patients underwent intraoperative SRS ligation. SRS was easily found and isolated below the distal pancreas in all cases.

Results
Pre-LT MELD score was 15.9±6.4 (8-33). Main PV diameter was 7.9±2.9 mm (4.0-13.9). PV thrombectomy was accompanied in 7 cases. Except one hospital mortality, 15 patients showed favorable outcome. The mortality was related with sepsis, but not with liver dysfunction. One patient received simultaneous splenic artery (SA) ligation due to strong PV flow during LT. Massive and prolonged ascites after LT was presented in four patients with small diameter of PV (<7.5 mm). They were living donor recipients, and not related with pre-LT ascites. Among them, one patient received SA embolization at postoperative days 30, and ascites was well controlled after that. In the other three, ascites was tolerable and well controlled by drainage and/or diuretics. After the case of SA embolization, we performed test clamp of SRS before ligation in small diameter of PV, and applied PV pressure monitoring in patients who showed a sign of portal hypertension such as
bowel edema. In two cases, we applied total or partial SRS ligation under PV pressure monitoring, within 8mmHg of pressure difference between pre- and post-SRS ligation. There was no portal hypertensive sign in the other 12 patients. Fifteen patients have maintained normal liver function until last follow-up.

**Conclusions**
Intraoperative SRS ligation was safe and effective method to solve big SRS. However, severe portal hypertension after shunt ligation needed to be concerned in small diameter of PV, and selective simultaneous intraoperative portal pressure monitoring could be helpful for prevention of it.

**Keywords**: Varix, Shunt, Portal Hypertension, Liver Transplant

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**Response Guided Therapy for Hepatitis C Virus Recurrence Based on Early Protocol Biopsy after Liver Transplantation**

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**Background**
Hepatitis C virus (HCV) recurrence after liver transplantation (LT) is universal and progressive. There is a trend of protocol biopsy based HCV treatment. Here, we report the recent results of response guided therapy for HCV recurrence based on early protocol biopsy after LT.

**Methods**
We reviewed the patients who underwent LT for HCV related liver disease (defined as positive HCV RNA) between 2010 and 2012. In recipient who showed positive HCV RNA after LT, the protocol biopsies were done at 3, 6 and 12 months after LT. In histological HCV recurrence (defined as fibrosis or ≥ moderate inflammation on histology, and mild hepatitis combined with abnormal liver function test), we started treatment with ribavirin and pegylated interferon. We adjusted treatment period according to the individual treatment response.

**Results**
Among 41 HCV related recipients, 61.0% (n=25) underwent protocol biopsies more than once and enrolled in this study. The mean follow-up was 32.4 months (range, 15-48 months) after LT. The genotype 1 and 2 were in 56.0% and 36.0%. Finally, 28.0% started HCV treatment after biopsy at 3 months post-LT, 68.0% at 6 months, and 80.0% at 12 months (n=20/25). Among 20 patients, rapid or early virological response was 95.0%. Twenty-percent of patients discontinued the treatment due to non-tolerance or non-adherence (n=4). Except 3 patients on treatment, 13 patients finished the treatment and all showed negative HCV RNA at the end of treatment (65.0%, n=13/20). Even though 15.0% was still on treatment, sustained virological response was 50.0% (n=10/20), and 33.3% in genotype 1 (n=4/12) and 75.0% in non-genotype 1 (n=6/8) (p=0.170). Until last follow-up, HCV RNA remained negative in 75.0% (n=15/20). Overall 3-year survival was 100.0% in 25 patients who underwent protocol biopsies.

**Conclusion**
Response guided therapy for HCV recurrence based on early protocol biopsy after LT showed encouraging result.

**Keywords**: HCV Recurrence, HCV Treatment, Hepatitis C Virus, Liver Transplantation, Protocol Biopsy

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**Different Outcomes of Patients with Below Milan Criteria Just Before Liver Transplantation**

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**Purpose**
To compare outcomes of patients with below Milan criteria just before liver transplantation (LT).

**Methods**
From 2009 to 2014, 47 patients with HCC were underwent
LT at our center. Thirty-one patients (66%) were below Milan criteria and sixteen patients (34%) were above Milan criteria just before LT. We grouped patients with below Milan criteria into 3 categories: 1. Patients with below Milan criteria at initial diagnosis and they were not underwent any down-staging treatment until LT (BM group); 2. Patients with below Milan criteria at initial diagnosis and they were underwent down-staging treatment until LT (BM-D group); 3. Patients with above Milan criteria at initial diagnosis but they were underwent down-staging treatment and they succeed to enter below Milan criteria just before LT. We compared outcome of these groups after LT.

**Results**

BM group included 5 (16.1%) patients, BM-D group included 14 (45.2%) patients, and AM-D group included 12 (38.7%) patients. Baseline clinical characteristics included age, sex, original disease, underlying disease, Model For End-Stage Liver Disease (MELD) score, preoperative recipient’s condition, graft ischemic time, operation time, and intraoperative blood loss were similar in each group. There were different of 3 year overall survival with each group (BM group 100%, BM-D group 71.4%, and AM-D group 91.7%, figure 1), but, there were no statistical difference ($p=0.411$). Also, there were different of 3 year disease free survival with each group (BM group 100%, BM-D group 81.8%, and AM-D group 57.3%, figure 2), but, there were no statistical difference ($p=0.301$).

**Conclusion**

This study has limitation of too less case and too short follow period. So it can’t be secure evidence for different outcome of these groups. But, we thought that if LT is possible without down-staging treatment, immediate LT can provide better outcome for patients with below Milan criteria. And, although patients were below Milan criteria just before LT, more intensive follow up for recurrence will be essential for the down-staged patients before LT.

**Keywords**: Liver Transplantation, HCC, Milan, Down Staging
Background
Fatty liver is critical for donor selection, which has been associated with a risk of complication for both donor and recipient after liver transplantation. After living donor weight reduction for a short-term, the change of liver fat percentile and pathologic findings were investigated.

Methods
A total of 356 living donor candidate were between January 2011 and November 2013 at a single center. Of them, 18 donors tried to lose their weight reduction. Fat fraction was estimated on preoperative non-invasive MR spectroscopy. And liver biopsy findings were analyzed before and after weight reduction.

Results
Eighteen donor candidates lose mean 3.6 ± 3.1 kg of their weight for mean 43.9 ± 31.0 days (range 7-107 days) and BMI was significantly decreased to 25.9 ± 3.1 kg/m² from 27.1 ± 3.2 kg/m² (p < 0.001). Their fat fractions were also significantly decreased to 6.8 ± 4.5% from 11.4 ± 4.7% (p < 0.001). Although preoperative liver biopsy showed that ballooning change (n=3, 23.1%), inflammation (n=9, 69.2%), fibrosis (n=2, 15.4%) and necrosis (n=3, 16.7%) before weight reduction, intraoperative biopsy showed no fibrosis, no necrosis, decreased inflammation (n=2, 17.6%) and improved ballooning change of hepatocyte (n=1, 5.9%) after weight reduction [table 1]. Although one candidate could not donate his liver finally because of steatohepatitis, the others recovered uneventfully.

Conclusions
Donor body weight reduction can expand donor pool and contribute to donor safety.

Keywords: Liver Donor, Weight Reduction, Pathologic Change

Donor Age over than 55 Years Old in Living Donor Liver Transplantation

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Background
The significance of donor age in living donor liver transplantation (LDLT) has not been fully evaluated, present study was to evaluate the influence of donor age on graft function and outcomes in recipients and donors.

Patients and Methods
We included 93 adult recipients who underwent LDLT from May 1996 to September 2013.

According to the age of donor, recipients were divided into two groups: older >55 years of age and younger ≤55 years of age.

For each patient with older donor graft (donor age >55), a patient with younger donor graft (donor age ≤55) matched by Graft to Recipient body weight ratio, Child-Pugh class, Model for end stage Liver disease score and existing of hepatocellular carcinoma was selected.

We collected retrospectively patient characteristics, and posttransplant clinical outcomes and survival were compared between two groups.

Results
Baseline characteristics were not different between the two groups, except for more number of male donors in the younger group. The frequencies of allograft rejection, Biliary complication, vascular complication and laboratory results of recipients after transplantation were similar in the two groups.

Hospital stay and post operation complications of the older donor group were not significantly higher than those of the younger donor group(P=0.27 and P=1.00, respectively).

Macrosteatosis in the older age group of donor is significantly higher than in the younger age group(11.35%±9.91 vs. 7.35%±8.2, P=0.04). But both group had the macrosteatosis rate of less than 30. There was no significant
differences in mortality within 60 days after LDLT between 2
groups (4.8% vs 6.5%, P=1.00).
The cumulative 2-year survival rates were 80.9% in younger
age group and 75.4% in older group of donor without
substantial difference (P=0.279).

Conclusion
The surgical outcomes of recipient using older donor livers
were comparable to those using younger donor livers for
LDLT and safety of the donor over the age of 55 is similar to
the donor of 55 years old or less.

Keywords: Liver Transplantation, Donor, Age

Result of Extracorporeal Membrane Oxygenation
(ECMO) Support in Cardiac Arrest of the
Liver Transplantation Recipients

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Introduction
Recipients of the liver transplantation have many risk factors
for the operation. Intraoperative bleeding due to underlying
cogulopathy, thrombocytopenia can increase hemodynamic
unstability, and procedures during the operation like IVC
clamping, reperfusion after anastomosis also affect. These
conditions can cause some cardiac problems, even cardiac
arrest during the transplantation. We present 3 cases of
survivor after cardiac arrest, and discuss usefulness of
ECMO in this situation.

Patients and Method
We reviewed 3 cases of survivor after cardiac arrest in 403
cases of living donor liver transplantation from March 2009
to March 2013.

Results
All patients were male and had no previous cardiac problems.
1 case had Non B, non C liver cirrhosis and 2 cases had
hepatitis B related liver cirrhosis. In all 3 cases, cardiac arrest
was happened but there is no definite reason. We inserted
ECMO in 2 cases intraoperative period and postoperative
1-day after transplantation in 1 case. After ECMO was
inserted, vital sign was recovered immediately, but acute
pulmonary edema was found in chest x-ray. We checked
daily echocardiography at immediate postoperative period in
all patients. After checking recovery of chest x-ray, we
weaned ECMO. Cardiac output also recovered and there is
no cardiac complication after weaning of ECMO. Finally, 2
cases had no serious postoperative complication, 1 case had
cerebral infarction after cardiac resuscitation, but liver
function was normal and all patients survive now.

Conclusion
Immediate ECMO application could be useful in the cardiac
arrest in liver transplantation.

Keywords: Extracorporeal Membrane Oxygenation, Cardiac
Arrest, Liver Transplantation

Liver Transplantation for far Advanced
Hepatocellular Carcinoma: Analysis for its
Prognostic Factor

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Background
Patients with numerous or huge hepatocellular carcinoma
(HCC) and portal vein tumor thrombosis (PVTT) had poor
survival outcomes and considered as contraindication for
liver transplantation (LT). We analyzed our experience with
LT for far advanced HCC to assess the prognosis of patients
and determine the adequate selection criteria using several
preoperative parameters.
Methods
A total of 29 patients, with far advanced HCC, defined as larger than 10 cms in size or more than 10 numbers, or PVTT at preoperative radiologic findings, without extrahepatic metastasis, who underwent LT from January 2003 to February 2013 at single center were investigated retrospectively. Demographics, disease free survival (DFS) and overall survival (OS) of total study population were demonstrated. We investigated the demographics, history of pre-LT treatment, preoperative tumor status including size, number and presence of PVTT, serum alpha-fetoprotein (AFP) level, and postoperative histologic variables, such as microvascular invasion and poor histologic grade to identify the prognostic factor, consequently determine the selection criteria of LT for far advanced HCC.

Results
1-, 3-, 5- year DFS and OS of total study population were 44.3%, 30.5%, 30.5% and 75.6%, 45.1%, 40.6%, respectively. 10 patients had no tumor recurrence and there was 1 patient of mortality, not related with HCC (the mean DFS and OS were 46.5 (10.3 - 111.2) months). The mean DFS and OS of 19 patients with tumor recurrence were 8.2 (1.0 - 35.2) months and 21 (1.6 - 59.3) months. There were no statistical differences of DFS (p=0.440) and OS (p=0.795) according to PVTT. However, there were significant different of DFS (hazard ratio 5.314, 95% CI 1.946-14.509, p=0.001) and OS (hazard ratio 3.927, 95% CI 1.359-11.350, p=0.004) after LT according to serum AFP level. Patients with serum AFP level less than 200 ng/mL (1-, 3-, 5- year DFS and OS, 68.2%, 49.1%, 49.1% and 93.8%, 65.3%, 65.3%) had favorable prognosis compared with serum AFP level more than 200 ng/mL. (1-, 3-, 5- year DFS and OS, 15.4%, 0%, 0% and 61.5%, 23.1%, 15.4%)

Conclusions
The patients with far advanced HCC have usually poor prognosis. However, the patients even with far advanced HCC can have better outcome after LT if we select the candidates carefully by better selection criteria such as AFP, which represents the biologic component of tumor.

Keyword: Advanced Hepatocellular Carcinoma, Portal Vein Tumor Thrombosis, Liver Transplantation, Alpha-Fetoprotein, Recurrence, Survival
thrombectomy of IVC after total heptectomy of remnant liver with HCC was performed. The implantation of the explanted left lobe was performed by means of the technique of living donor liver transplantation. His postoperative course was uneventful except medically controlled ascites. We introduce the new technique of liver autotransplantation after in-situ heptectomy for huge hepatocellular carcinoma involving supr-hepatic IVC and this procedure will be valuable in selected cases in our opinion.

Keywords: Hepatocellular Carcinoma, Autotransplantation

Radiotherapy as Down Staging Treatment to Living Donor Liver Transplantation for Hepatocellular Carcinoma

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Purpose
Curative surgical resection cannot be an option for most patients with hepatocellular carcinoma (HCC) because of underlying liver disease or extent of tumor. Radiotherapy (RT) for HCC is not generally considered a treatment of choice but RT has been used in advanced HCC patients such as portal venous tumor thrombosis (PVTT) and multiple large tumors. Recently, some studies showed that RT may be bridge to living donor liver transplant (LDLT). We report our experience with RT as pretransplant therapy.

Methods
Between May 1996 and March 2013, total 1360 patients treated by LT in our institution. Thirteen patients had history of RT and we analyze these patients retrospectively. Objective tumor response is evaluated with CT and/or MRI according to modified RECIST criteria and outcomes is estimated by disease free survival (DFS) and overall survival (OS).

Results
Before RT, seven patients exceed Milan criteria, and four patients have PVTT (Table 2). All patients are LDLT and interval between RT and LDLT is 719.7 days (Table 3). 3, 6 months and 1 year DFS is 82.5%, 73.3%, 55.0%, respectively. And as shown in Table 4, 5, low AFP group (<20ng/mL) and good objective tumor response after RT group have good prognosis compare with the other group.

Conclusion
LDLT is feasible in advanced HCC patients who have low AFP levels and good tumor response after RT

Keywords: Radiotherapy, Hepatocellular Carcinoma, Liver Transplantation
Use of Dexmedetomidine in Liver Transplant Recipients with Postoperative Agitated Delirium

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Backgrounds
Agitated delirium has frequently occurred after liver transplantation (LT) in the intensive care unit (ICU) and sedative agents are used to treat. Recently, dexmedetomidine has been considered to be a promising agent for agitated delirium.

Methods
To compare dexmedetomidine and haloperidol, the total ICU length of stay (ICU LOS), the ICU LOS after drug administration, and the supplemental doses of sedative agents used were assessed.

Results
This study took place between January 2010 and October 2012, when our institution performed 380 LT procedures. Of these, 42 recipients were retrospectively enrolled. Sixteen recipients were enrolled in the dexmedetomidine group and 26 recipients were placed in the haloperidol group. The end-point was discharge from the ICU. There were no significant drug-related complications in either group. Dexmedetomidine significantly decreased the ICU LOS and ICU LOS after the occurrence of delirium compared to haloperidol (13.7 days vs. 8.3 days, p=0.039, 10.1 days vs. 3.1 days, p=0.009). In the dexmedetomidine group, the dose of supplemental midazolam needed was lower than in the haloperidol group (1.5 mg vs. 6.85 mg, p<0.001).

Conclusion
Dexmedetomidine is a promising agent for the treatment of ICU associated agitated delirium in LT recipients.

Keywords: Liver Transplantation, Postoperative Agitated Delirium, Sedation, Dexmedetomidine, Haloperidol, Midazolam, Lorazepam

Use of Metformin in Liver Transplant Recipient with Hepatocellular Carcinoma

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Introduction
It has become apparent that the diabetes after transplantation has serious consequences for the patient, being associated with reduced graft function, patient survival, and increased risks for cancers. But there is no clear rationale to deny vast numbers of recipients the assemblage of clinical benefits attributed to metformin therapy in the absence of definitive contraindications.

Methods
Between May 1996 and November 2013, total 641 HCC patients treated by LT in our institution. Forty three recipients had medication history of metformin and 21 of these recipients were NODAT. We analyze these recipients retrospectively. Safety is estimated by history of drug complication and outcome is estimated by disease free survival (DFS) and overall survival (OS).

Results
7 recipients underwent deceased donor liver transplantation (DDLT) and 36 recipients underwent living donor liver transplantation (LDLT). Preoperative eGFR (estimated glomerular filtration rate) of recipients of NODAT and
non-NODAT were 92.1 (32.8 - 129) and 101.4 (55.6 - 211.9) respectively, and eGFR before medication of recipients of NODAT and non-NODAT were 87 (56.2 - 130.2) and 99.05 (43 - 232.9). Median duration days of medication was 885 (50 - 3794) and most frequent drug complication was hypoglycemia (14 %). 5 recipients had history of renal function impairment and these recipients had metformin withdrawal and there was no recipients had history of lactic acidosis. Disease free survival and overall patient survival rates at 1 and 2 year were 97.7, 94.7 % respectively.

Conclusions
Metformin-associated lactic acidosis is extremely rare complication in LT recipients because their short-term, regular follow up. And metformin can be a promising agent for the HCC related LT recipients with or without NODAT, and we suggest that this warrants further testing for chemopreventive effect of metformin in case control trial.

Keywords : Liver Transplantation, NODAT, HCC, Metformin

PE-61
An Experience of Tertiary Liver Transplantation: A Case Report
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Background
Retransplantation of liver is the only potential cure when it happens graft failure. Each year, retransplantation of liver is estimated to account for 7-10% in US. The most common indication for liver retransplantation is primary nonfunction and hepatic artery thrombosis. We underwent one case of tertiary retransplantation of liver and two cases of retransplantation among 150 cases liver transplantation between May 2010 and April 2014. We report one case of tertiary retransplantation of liver in our institute.

Case
55 year old man admitted for Hepatitis B with liver cirrhosis. He underwent 16th Transarterial chemoembolization for multiple hepatocellular carcinoma and radiative therapy for Rt. Adrenal metastasis. Emergent deceased donor liver transplantation was carried out. He took the marginal donor graft with macroscopic 60% fatty change. The postoperative progression is poor, he showed hemodynamic deterioration and primary nonfunction. Inevitableley, He underwent total hepatectomy with temporary portocaval anastomosis for controlling his septic condition. The second liver transplantation was carried out after 3 days from 1st transplantation. But 2nd donor was marginal, too. The donor was old age(71 years) and non-heart beating donor. The patient fell into primary nonfunction, again. Consequently, the 2nd operation was played a role as bridge transplantation. At 4 days later, the 3rd transplantation was carried out. The patient’s progression improved well thereafter. The patient is currently focusing on rehabilitation.

Conclusion
Two-stage total hepatectomy with temporary portocaval anastomosis, and subsequent liver transplantation can be a life-saving approach in patients most likely to die of graft failure that cannot be controlled by conventional treatment or immediate liver transplantation.

Keywords : Liver, Transplantation, Tertiary

PE-62
Combination Therapy of Sirolimus and Sorafenib for Recurrent Hepatocellular Carcinoma after Liver Transplantation
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Backgrounds

Sirolimus and sorafenib have both been used in recurrent hepatocellular carcinoma (HCC) patients after liver transplantation (LT). In the present study, we evaluated the side effects and efficacy of a combination therapy consisting of sirolimus and sorafenib.

Methods

We retrospectively reviewed patients who had recurrent HCC after LT between 2005 and 2012. Toxicity was evaluated by reviewing medical records for each follow-up visit. Efficacy was evaluated according to the modified RECIST guidelines.

Results

A total of 24 patients who received combination therapy were reviewed to evaluate drug toxicity. Side effects included hand-foot syndrome (n=12, 50%), diarrhea (n=7, 29.2%), fatigue (n=2, 8.3%), and alopecia (n=1, 4.2%). Among the 24 patients enrolled in this study, 19 were evaluated for efficacy. A complete response was observed in only 1 case (5.3%), while a partial response was observed in 2 cases (10.5%). Five cases (26.3%) showed disease stabilization. The median overall survival after initiation of the combination therapy was 21.6 months. In comparison, 26 recipients with recurrent HCC received non-combination therapy. The median survival of patients receiving a non-combination therapy was 12.0 months. However, there was no statistically significant difference in patient survival rate between the combination and non-combination therapy groups (P=0.101).

Conclusion

Combination therapy of sorafenib and sirolimus for recurrent HCC LT recipients may be useful for disease management. However, controlled prospective study is needed to further evaluate the safety and efficacy of combined sorafenib and sirolimus therapy.

Keywords: Hepatocellular Carcinoma, Sirolimus, SoraFenib, Liver Transplantation, Tumor Recurrence

Supply of Probiotics Reduces Post-transplant Early Infection Rates after Liver Transplantation: A Single Center Observational Cross-Sectional Study

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Bacterial infections frequently occur early (within on months) after liver transplantation (LT) and main cause of posttransplant death. Recently, there are several reports about that probiotics can reduce postoperative infections in patients undergoing colorectal resection for cancer. Now, our aim is to investigate whether the posttransplant outcomes can be better in patients receive supply of probiotics following LT. An observational cross-sectional study was undertaken in 381 LT recipients. Comparison was made between one group (A) receiving a probiotics and another group (B) did not. One hundred thirty patients belonged to group A and 251 patients belonged to group B. Probiotics was given in group A on the postoperative day 1 and continued until the first day of a clinic visit. Early infection rate (within one month), duration of antibiotic therapy, noninfectious complications and one year mortality rate were recorded. The incidence of posttransplant early bacterial infections was significantly reduced [group A (2.3%) versus group B (7.2%); P = 0.049]. Postoperative hospital stay was significantly shorter in group A. However, there was no significant difference in one year mortality rate between both groups. Posttransplant supply of probiotics reduces early bacterial infection rates following LT. Multicenter randomized prospective study is required to confirm our findings.

Keywords: Probiotics, Posttransplant Infection, Liver Transplantation
Factors Associated with Adverse Outcomes after Liver Transplantation for Liver Donors: A Nationwide Study

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Background
Little was known about the perioperative outcomes after liver transplantation for liver donors. This study evaluated factors associated with adverse events after liver transplantation for liver donors.

Methods
Reimbursement claims from the Taiwan’s National Health Insurance were used to investigate the outcomes after liver transplantation for 1227 liver donors from 2004 to 2007. Preoperative sociodemographics and coexisting medical conditions were collected. The adjusted odds ratios (ORs) and 95% confidence intervals (CIs) of postoperative 30-day adverse events (such as septicemia, pneumonia, stroke, acute myocardial infarction, acute renal failure, deep wound infection, postoperative bleeding, urinary tract infection, and mortality) and associated factors were calculated in the multivariate logistic regressions.

Results
Older age of 50-59 (OR 2.39, 95% CI 1.01-5.65), 60-69 (OR 4.26, 95% CI 1.39-13.0), and ≥70 (OR 12.6, 95% CI 4.21-37.5) years were associated with adverse events after liver transplantation for liver donors. Preoperative liver cirrhosis (OR 2.27, 95% CI 1.00-5.18), pulmonary tuberculosis (OR 8.99, 95% CI 2.19-36.9), hypertension (OR 3.13, 95% CI 1.36-7.19) were also associated with adverse events after liver transplantation for liver donors.

Conclusion
For liver donors, older age, liver cirrhosis, pulmonary tuberculosis, and hypertension were associated with adverse outcomes after liver transplantation.

Keywords: Liver Transplantation, Liver Donor, Outcomes

Clinical Impact of 18F-FDG-PET/CT in Living Donor Liver Transplantation for Advanced Hepatocellular Carcinoma

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Background
The relevant number of patients with hepatocellular carcinoma (HCC) beyond the Milan criteria has undergone living donor liver transplantation (LDLT). However, the prognostic factors for these patients with advanced HCC are not well established.

Methods
From March 2005 to May 2013, 280 patients with HCC underwent LDLT in the National Cancer Center. Among these, patients beyond the Milan criteria were retrospectively enrolled. We analyzed the prognostic significance of 18F-fluorodeoxyglucose positron emission tomography/computed tomography (18F-FDG-PET/CT) for selecting appropriate candidates.

Results
Among total 280 patients, 147 patients (52.5%) were confirmed to have HCC beyond the Milan criteria using pathological reports. The patients who met and exceeded the Milan criteria had 5-year overall survival (OS) rates of 87.2% and 64.6%, respectively, \( p < 0.001 \) and disease-free survival (DFS) rates of 89.8% and 56.7%, respectively \( p < 0.001 \). In multivariable analysis for OS and DFS in patients beyond the Milan criteria, PET/CT positivity [hazard ratio (HR) 2.714, \( p = 0.013 \) for OS; HR 3.803, \( p < 0.001 \) for DFS], total tumor size over 10 cm (HR 2.333, \( p = 0.035 \) for OS; HR 3.334, \( p = 0.001 \) for DFS), and microvascular invasion (HR 2.917, \( p = 0.025 \) for DFS) were significant prognostic factors. OS and DFS of patients with a PET/CT-positive
status within the Milan criteria were not significantly different compared with those of patients with a PET/CT-negative status beyond the Milan criteria. In particular, patients beyond the Milan criteria with a PET/CT-negative status and total tumor size < 10 cm showed similar OS and DFS in comparison with those within the Milan criteria.

**Conclusions**

A PET/CT status in LDLT is a useful marker to predict survival of patients with advanced HCC.

**Keywords**: PET/CT, LDLT, HCC