
KAHBPS-O-PL-01

Proposal of future remnant liver-indocyanine green clearance rate for risk assessment of major hepatectomy - What is its cutoff ?

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(Purpose) For risk assessment of major hepatectomy, quantitative and qualitative parameters of the liver should be considered at the same time. Since liver resection rate and indocyanine green (ICG) retention rate at 15 minutes (ICG-R15) are independent parameters, we have used an integrated factor of ICG-k fraction of the future remnant liver (FRL) (FRL-kICG), which is a product of ICG-k value divided by the FRL volume proportion to the total liver volume (TLV). This study was intended to determine the reliable cutoff value of FRL-kICG by using two different study populations with normal and diseased livers. **(Methods)** This study consisted of two parts, each using 2155 living liver donors and 723 patients with hepatocellular carcinoma undergone right hepatectomy. **(Results)** Living donor study revealed the median liver parameters as TLV of 1229 mL, standardized liver volume of 696.5 mL/m², right liver volume proportion 65.5%, ICG-R15 7.9%, and ICG-k of 0.17. A regression equation for standard liver volume (SLV) was obtained as follows: $SLV (mL) = -456.3 + 969.8 \times \text{body surface area (m}^2)$ ($r=0.707$, $r^2=0.500$, $p=0.000$). Range of error between individualized and formula-derived TLV was $-1.7 \pm 12.9\%$. The correlation between ICG-R15 and ICG-k was expressed as follows: $ICG-k = 0.31 - 0.15 \times \log_{10}(ICG-R15 [\%])$. Patients showing FRL-kICG < 0.04 and ICG-R15 > 15% occu-

ried 1.2%, thus the cut-off of FRL-kICG was set at 0.04 in normal livers. This cutoff was valid for left and right hepatectomy in 99.0% of donor (2133 of 2155 donors). In HCC patient study, the median liver parameters were ICG-R15 of 10.5%, ICG-k of 0.14 and FRL volume proportion of 41.5%. FRL-kICG < 0.05 was found in 23 (3.2%). The primary causes of perioperative mortality (n=6) were technical complications (n=2 with SLV-corrected FRL-kICG ≥ 0.05 and no portal hypertension) and hepatic failure (n=4 with SLV-corrected FRL-kICG < 0.05 with portal hypertension). Overall 5-year patient survival rates were 55.7%. **(Conclusion)** FRL-kICG was proven to be a reliable parameter reflecting the risk of major resection. We suggest that its cut-off value would be 0.04 for normal livers, but it appears to be reasonable to set at 0.05 for cirrhotic livers, which is the traditionally suggested value.

KAHBPS-O-PL-02

Physical, social and psychological situation of donors long term after donation in living donor liver transplantation

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(Purpose) To justify the exposure of living donors, typically healthy adults to such an operation in living donor liver transplantation (LDLT), it is important to have a clear understanding of their clinical outcomes. However, information on the long-term health of living donors is incomplete. Thus, we investigated physical, social and psychological situations of living donors long term after

donation. **(Methods)** We investigated our experience for 538 living donors who had at least more than 5 years of follow-up after donation between January 1999 and June 2009. Physical situation including overall morbidity and mortality, wound related problems, and chronological changes of liver functions using laboratory test of total bilirubin (TB), aspartate aminotransferase (AST) and alanine aminotransferase (ALT), and platelet count were analyzed. Social situation as duration until return to work after donation and changes of pre- and post-donation occupation were examined. Psychological situation was assessed with questionnaires including the Medical Outcomes Study 12-Item Short-Form Health Survey version 2 (SF12-v2). **(Results)** 202 among 538 donors answered questionnaires (37.5%). Overall morbidity rate was 25.2% (51/202 donors). 26 donors had donation related morbidity including wound related problems (n=21), paralytic ileus (n=3), biloma (n=1), and liver function test elevation (n=1) and 25 donors had donation unrelated morbidity (the most common cause, cardiovascular disease). Overall mortality rate was 1.0% (2/202 donors) and the cause of death were donation unrelated problems; pancreatic cancer (n=1) and traffic accident (n=1). 21 donors visit plastic surgeon clinics due to wound problems and 5 donors had treated (injection [n=2] and surgery [n=3]). Median laboratory values after 1 week of donation were elevated, however, all of the values return to normal range after 3 months and persist more than 5 years. 46 donors had a TB >1.5 mg/dl after 1 year and most of them also had elevated TB before donation diagnosed as Gilbert syndrome. In social situation, 79.0% of patients return to work within 3 month after donation. 58.9% of donors had occupation before donation, however 79.2% of donors had occupation after donation and it might be due to higher proportion of young aged donors. Psychological situation of donors was significantly better than that in control adult population across all measured quality of life domains. **(Conclusion)** Physical, social and psychological situation of do-

nors long term after donation in living donor liver transplantation were comparatively well preserved.

KAHBPS-O-PL-03

Outcomes between ABO-incompatible living donor liver transplantation (LDLT) and ABO-compatible LDLT: A matched study.

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(Purpose) Reports from several experienced centers suggested that outcomes of an ABO-incompatible (ABOi) living donor liver transplantation (LDLT) after rituximab and reduction of ABO antibodies showed a high success rate. However, there are few detailed comparative data regarding biliary complications, infectious episodes, and patient survival between ABO-compatible (ABOc) and ABOi LDLT. We compared the outcomes of ABOi LDLT with those of ABOc LDLT using matching method. **(Methods)** Forty-seven ABOi LDLT cases were performed between 2010 and 2013. Matched variables were the time of LDLT, Child-Pugh class, gender, age, model for end-stage liver disease (MELD) score, hepatic steatosis in living donor, liver graft, graft-recipient weight ratio (GRWR), and diagnosis. ABOc LDLT cases were selected according to matched variables (1:2 matching). **(Results)** Seventy-four patients in ABOc LDLT cases were selected as control group. The incidences of CMV infection, bacterial infection, and fungal infection at 3 months in between ABOi LDLT group and ABOc

LDLT did not reach significant (81.1% vs 75.5%, 27.7% vs. 37.2%, and 12.8% vs. 20.2%, respectively). The incidence of acute rejection in ABOi LDLT was 12.8%. Antibody-mediated rejection was two cases in the early posttransplant period, but liver function in two cases were improved with plasmapheresis. There was no differences in acute rejection and biliary complications between ABOi and ABOc (P=0.478 and P=0.511, respectively). However, three cases in ABOi group developed non-bile duct anastomosis strictures, and these patients occurred to graft failure. The 1-year, 2-year, and 3-year patient survival rates in ABOi LDLT and ABOc LDLT were 89.3%, 85.0%, 85.0% and 87.2%, 83.3%, 78.75, respectively. **(Conclusion)** The outcomes of ABOi LDLT were similar to those of ABOc LDLT. ABOi LDLT should be considered in patients without suitable donor.

KAHBPS-O-PL-04

Validation of 7th AJCC staging system for resection of intrahepatic cholangiocarcinoma: Single-center experience of 770 cases

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(Purpose) According to the 7th AJCC staging system, solitary intrahepatic cholangiocarcinoma (IHCC) is classified as T1 regardless of tumor size, whereas any lymph node metastasis is regarded as stage IV. This study intended to validate the prognostic stratification of current staging system after resection of IHCC, with special concern on the prognostic impact from tumor size of solitary lesions. **(Methods)** A co-

hort of 770 patients who underwent surgery of IHCC were selected for the study population, with all patient follow-up period ≥ 24 months or until death with no patient censored during survival analysis. **(Results)** Operation types were R0 resection in 538, R1 resection in 120, and R2 resection in 112. In R0 and R1 groups, anatomical resection and concurrent bile duct resection were performed in 600 and 97, respectively. Median survival period following R0, R1 and R2 resections were 28 months, 12 months and 3 months, respectively (p=0.000). Median survival period following R0 resection were 41 months in stage I, 26 months in stage II, 24 months in stage III, and 11 months in stage IV. Overall 5-year patient survival rates following R0 resection of solitary IHCC were 50.1% in tumor size <2 cm (n=51), 42.6% in tumor size 2.0~3.9 cm (n=153), 34.6% in tumor size 4.1~5.9 cm (n=119), 29.4% in tumor size 6.1~7.9 cm (n=81), 11.3% in tumor size 8.1~9.9 cm (n=39), and 23.0% in tumor size ≥ 10 cm (n=35), showing stepwise incremental deterioration of long-term survival outcomes along tumor size (p=0.000). **(Conclusion)** This validation revealed that the stratification of current version of AJCC staging for IHCC is reasonably established, but the prognostic impact from tumor size was underestimated. Therefore further validation was necessary for T stage definition of solitary IHCC lesions.

KAHBPS-O-PL-05

Improvement in clinical outcome of patients with gallbladder cancer

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(Purpose) Chronological changes in clinicopatho-

logic characteristics and survival outcomes of gallbladder cancer (GBC) were investigated. **(Methods)** A total of 686 patients who consecutively underwent surgery at Seoul National University Hospital between 1987 and 2014 were analyzed. Clinicopathologic changes were explored according to the treatment period (P), P1 (1987-2000, n=249) and P2 (2001-2014, n=437). To evaluate actual survival, only the patients who underwent surgery between 1987 and 2010 were included in survival analysis. **(Results)** Of the 686 patients, mean age was 63.3 years and 52.3% (n=359) were female. Stage I, II, III, and IV were noted in 12.5%, 21.4%, 31.9%, and 20.7% of patients, respectively. Proportion of extended cholecystectomy (EC), cholecystectomy, pancreaticoduodenectomy, and extended right hemihepatectomy were 42.1%, 32.4%, 5.0%, and 3.9%, respectively. R0 resection rate was 63.3%. Comparing P1 and P2, mean age (61.2 vs. 64.6 years, $p<0.001$), asymptomatic presentation (14.1% vs. 35.7%, $p<0.001$), proportion of EC (26.5% vs. 51.3%, $p<0.001$), R0 resection (49.2% vs. 72.1%, $p<0.001$), tumor below stage II (33.9% vs. 42.7%, $p=0.039$), and the patients who received adjuvant chemotherapy (16.9% vs. 36.2%, $p<0.001$) and radiotherapy (8.4% vs. 24.9%, $p<0.001$) were higher in P2. Gender, elevated serum CA 19-9, combined gallbladder stone, type of histology, and N stage were comparable between the two periods. Overall median survival (13.4 vs. 46.4 months, $p<0.001$) was better in P2, both in curative ($p=0.021$) and palliative ($p=0.013$) groups. In curative resection group, older age ($p<0.001$), symptomatic presentation ($p<0.001$), perineural invasion ($p=0.012$), and advanced stage ($p=0.001$) were independent poor prognostic factors. **(Conclusion)** Earlier detection and optimal surgical extent with aggressive attitude for treatment could improve the outcome of GBC over the period. However, effective treatment strategy should be developed for patients with poor prognostic factors.

KAHBPS-O-PL-06

Optimal extent of lymph node dissection for left-sided pancreatic cancer

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(Purpose) Lymph node metastasis is a poor prognostic factor in the patients with pancreatic cancer. However, there is still controversy that extended lymph node dissection is essential for left-sided pancreatic cancer. The aim of this study is to evaluate the outcomes according to the extent of lymph node dissection and tumor location in patients with left-sided pancreatic cancer. **(Methods)** From January 2005 to December 2013, we retrospectively identified 120 patients who underwent curative intent surgery for left-sided pancreatic cancer. We included only patients with grossly and microscopically no residual tumor. The left-sided pancreatic cancer were divided into pancreatic body or tail cancer. The lymph nodes were divided into three groups; celiac group, superior mesenteric group, and peripancreatic group. **(Results)** We included 120 patients with left-sided pancreatic cancer; 65 patients with pancreatic body cancer and 55 patients with pancreatic tail cancer. The median follow-up period was 16 months (range, 4 to 101 months). The 49 patients with pancreatic body cancer and 33 patients with pancreatic tail cancer underwent celiac group lymph node dissection. In patients with pancreatic body cancer, the celiac group lymph node dissection was associated with improved disease free survival (DFS) ($P=0.011$). However, celiac group lymph node dissection could not enhance DFS in patients with pancreatic tail cancer ($P=0.833$). Superior mesenteric group lymph

node dissection was not associated with survival outcomes in both pancreatic body and tail cancer patients. **(Conclusion)** Celiac group lymph node dissection improves survival in patients with pancreatic body cancer. However, it is not necessary in pancreatic tail cancer.

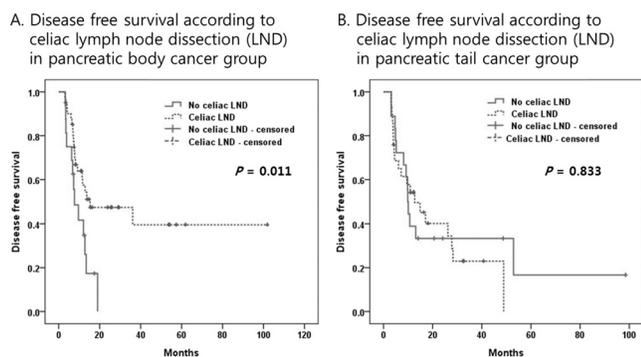


Fig. 1. Disease free survival according to celiac LND and tumor location.