# New developments in the treatment of hepatic tumors

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Conference Scene
Future Oncology

## 21st World Congress of the International Association of Surgeons, Gastroenterologists and Oncologists

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The International Association of Surgeons, Gastroenterologists and Oncologists (IASGO) hosted their annual world congress under the auspices of president Masatoshi Makuuchi from Japan and the general secretary Nicolas J Lygidakis. This year the congress was held in Tokyo, and the president was Wataru Kimura of Yamagata University. It is common knowledge that a major triple disaster struck Japan in March 2011. It was thought, for a time, that the congress would not take place, but the great courage and determination of the hosts allowed the conference to continue as scheduled. This congress was one of the most interesting hosted by the IASGO, evidenced by the presence of 909 participants from 59 countries, including invited speakers from Europe, America, Africa and Asia. The congress provided an opportunity to exchange knowledge of new techniques, methods of diagnosis and therapy. The program included symposiums, video presentations, free papers and poster presentations. This manuscript highlights presentations of the newest and most original material concerning the treatment of liver tumors, especially hepatocellular carcinoma.

### Improvements in determining prognosis

Y Goto and colleagues (Kurume University, Japan) delivered an interesting presentation regarding the determination of prognosis in patients undergoing surgical treatment for hepatocellular carcinoma (HCC). They presented a study that assessed, for the first time (to the best of their knowledge), the diagnostic accuracy of the portal vein slope gradient compared with other noninvasive assessments of compensated liver cirrhosis. The presence of cirrhosis and the stage of fibrosis are important factors in deciding therapeutic options and predicting prognosis, especially in cases of liver tumor resection. However, it is sometimes difficult to use conventional measurements to diagnose well-compensated cirrhosis. The behavior of the microbubbles in sonographic contrast medium in the portal vein may reflect hemodynamic changes due to hepatic fibrosis [1]. In this comparative study, patients were divided into two groups (noncirrhotic and cirrhotic) according to the histological findings of the resected specimens. Preoperative Sonazoid™ contrast-enhanced ultrasonography (US) was performed in all patients to measure the slope gradient of the hepatic artery, portal vein and hepatic veins, the hepatic vein arrival time and intrahepatic circulatory time. Biochemical markers of liver cirrhosis and liver stiffness were also measured by Fibroscan®. The authors concluded that the portal vein slope gradient, which is considered to reflect the hemodynamic changes of cirrhosis, is helpful as a noninvasive diagnostic modality for compensated liver cirrhosis.

T Ishizawa and colleagues (Tokyo University, Japan) conducted a prospective study that showed that intraoperative fluorescent imaging using preoperative intravenous injection of indocyanine green (ICG) could be used to identify liver cancers and areas of biliary congestion caused by tumor infiltration [2]. The authors used ICG (0.5 mg/kg), which had been injected intravenously for routine liver-function testing within 2 weeks before surgery, to obtain intraoperative fluorescent images of the liver surface and the cut surface of resected specimens. This method was used to detect small, peripherally located liver cancers that were not detected by visual inspection, palpation or intraoperative US, as well as cancer tissue on the cut surface of the liver, areas of biliary congestion caused by tumor infiltration, and early HCC in the resected specimens. They concluded that this method is useful for enhancing the accuracy of resection.

K Kasuya and colleagues (Tokyo University) described surgical resection of HCC using

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fluorescence navigation, which is a promising new technique for visualization of hepatic tumors that are not visible using conventional intraoperative contrast-enhanced US [3]. This method brings diagnostic MRI into the operating room using real-time virtual sonography (RVS). RVS uses MRI data stored on a personal computer to visualize multiplanar reconstructed MRI images corresponding to the site of the US probe, using a magnetic sensor. The site of the targeted tumor is marked by an US-guided puncture method using ICG, allowing the observation of fluorescence using an infrared camera (photodynamic eye). Surgical resection is then performed under fluorescence guidance. Advances in preoperative chemotherapy for unresectable tumors of the liver present new problems, especially for tumors that disappear preoperatively on computed tomography (CT) or MRI. This method may help to find hepatic tumors not visible on US and resect them under RVS guidance with ICG.

## Improvements in treatment

Couinaud was the first to properly describe the caudate lobe [4]. After this detailed description, the caudate lobe was divided into the Spiegel lobe, the caudate process and the paracaval portion. In patients without liver cirrhosis and with good liver function, the caudate lobe can be removed *en bloc* with the left or right lobe. In patients with liver failure, it is mandatory to spare as much tissue as possible during resection. Caudate lobe resection is one of the most technically complex liver procedures. T Takayama and colleagues (Nihon University, Tokyo, Japan) presented a comparative study of a resection technique starting at the right border of the caudate lobe, and continuing beneath the right and middle hepatic veins and the Arantius' ligament (attempting to transect the liver as close as possible to the root of the hepatic veins, proximally) [5]. They presented their personal experience of 66 patients presenting with HCC of the caudate lobe. Patients who underwent isolated caudate lobe resection had a better survival rate than patients in whom the caudate was resected together with the right or left lobe (5-year survival: 56 vs 30%).

These results were confirmed by another speaker at the congress. Y Sakamoto and colleagues (Tokyo University) undertook a retrospective review of cases and analyzed prognostic factors in patients who had undergone resection of a solitary HCC of the caudate lobe [6]. Their results showed a 5-year survival rate of 76% in patients with a single nodule in the caudate lobe and 45% in patients with a single nodule in another part of the liver. They concluded that even though surgical resection of the caudate lobe remains technically demanding, especially if the tumor is in the paracaval portion, the prognosis of patients with a solitary HCC in the caudate lobe was as good as in patients with a solitary HCC at another site.

C Wu and colleagues (Taichung General Hospital, Taiwan) presented an interesting technical solution for patients with a large HCC (>5 cm) located in the cranial part of the liver (segments 4, 7 or 8) and involving the major hepatic veins. These tumors require major or extended hepatectomy. Many patients cannot undergo resection owing to the risk of liver failure, but when a large inferior hepatic vein is identified on preoperative radiological examination, it is possible to resect the cranial part of the liver with preservation of the caudal portion [7]. The authors conducted a retrospective review of 62 patients who had undergone this procedure. They found that 18 patients needed additional major hepatic vein reconstruction due to a wide area of congestion in the remnant caudate lobe. The 5-year disease-free survival rate of the 62 patients was 27.5% and the 5-year overall survival rate was 41.6%. These data were not different from other cirrhotic patients with large tumors, and this procedure may increase the indications for resection of a large HCC and give satisfactory early- and long-term results.

T Hasegawa and colleagues (Tokyo University) presented their prospective review of 291 patients who underwent anatomical segmentectomy versus 119 patients who underwent nonanatomical segmentectomy. The 5-year disease-free survival rates were 33 and 17%, respectively ($p < 0.001$). They concluded that anatomical segmentectomy should be the first choice of surgical procedure for HCC, if liver function permits. This confirms the results of previous studies examining this issue [8].

Bile leakage is one of the most important and common complications after hepatic resection, because it is associated with an increased risk of sepsis and hepatic failure. M Kaibori and colleagues (Kansai University, Osaka, Japan) presented a randomized clinical trial evaluating ICG fluorescent cholangiography to prevent bile leakage [9]. They divided 102 patients who underwent hepatic resection without biliary reconstruction into two groups: a study group who underwent a leak test with IGC dye followed by IGC fluorescent cholangiography using

the photodynamic eye, and a control group who underwent a leak test with IGC dye alone. The results showed that 10% of the control group developed complications versus 0% of the study group. This technique may be useful for the prevention of bile leakage after hepatic resection.

### Improved survival based on epidemiological studies

M Kudo (Kinki University, Osaka, Japan) presented a prospective study conducted in cooperation with many surgeons representing the majority of centers for hepatic surgery in Japan, which analyzed the survival of HCC patients. To our knowledge, there are not many nationwide survival figures available for HCC, and these are from the USA, Japan and Korea. An improvement was reported in the overall survival rates of patients with HCC in Japan, using data from a nationwide registry that was started in 1965 by the Liver Cancer Study Group of Japan [10]. The authors presented data from 148,161 patients who were prospectively registered between 1978 and 2005, including their overall 5-year survival rates. The average survival time has increased from 4 to 50 months. This current overall survival time is the longest that has been reported worldwide.

T Takayama and colleagues (Nihon University, Tokyo, Japan) presented the results of a multivariate analysis to identify radicality criteria for HCC resection using data provided by the Liver Cancer Study Group of Japan [11]. The authors analyzed 11,668 patients and identified independent predictors that they then incorporated into newly proposed criteria. The major independent factors predicting survival were tumor number, tumor size and vascular invasion. The newly proposed criteria for determining radicality of HCC resection were based on these three tumor characteristics and two surgical factors (surgical margin and resection type), as follows:

- Radicality A: single tumor without vascular invasion, subdivided into A1: <5 cm with anatomical resection, and A2: >5 cm with nonanatomical resection;
- Radicality B: multiple tumors or vascular invasion;
- Radicality C: multiple tumors with vascular invasion or definite residual tumor.

The postoperative 5-year survival rates were: radicality A1: 75%, A2: 65%, B: 45% and C: 25%. These new radicality criteria may help to better design resection procedures and to better predict prognosis in HCC patients.

### Future prospects of laparoscopy

G Wakabayashi and colleagues (University of Iwate, Morioka, Japan) presented a case report of a patient who underwent simultaneous resection of colonic cancer and liver metastases. This technique is feasible, and is important because it enables earlier chemotherapy [12]. H Kaneko (Toho University, Tokyo, Japan) presented advances in laparoscopic surgery for the treatment of HCC. The 5-year overall and disease-free HCC survival rates have been reported to be almost the same in patients who underwent laparoscopic surgery and those who underwent open conventional hepatectomy, although further analysis is necessary to reach definitive conclusions [13]. Recently, laparoscopic extended liver resections have been performed including hemihepatectomy, hepatectomy for giant HCC, excision of tumors in the upper segment and excision of tumor recurrence. Furthermore, laparoscopic surgical procedures are advancing to using single-port, scarless techniques, which have also been applied to liver resection. These techniques are expected to develop further as a new frontier in laparoscopic liver surgery.

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