

Figure 1: Barcelona Clinic Liver Cancer staging system. HCC: hepatocellular carcinoma; PST: performance status of the patient; OS: overall survival; CLT: cadaver liver transplantation; LDLT: living donor liver transplantation; RF: radiofrequency; PEI: percutaneous ethanol injection; TACE: transcatheter arterial chemoembolization

Table 2: Child-Pugh scoring system

Parameter	Points assigned		
	1	2	3
Ascites	Absent	Slight	Moderate
Hepatic encephalopathy	None	Grade 1-2	Grade 3-4
Bilirubin $\mu\text{mol/L}$ (mg/dL)	< 34.2 (< 2)	34.2-51.3 (2-3)	> 51.3 (> 3)
Albumin g/L (g/dL)	> 35 (> 3.5)	28-35 (2.8-3.5)	< 28 (< 2.8)
Prothrombin time			
Seconds over control	< 4	4-6	> 6
INR	< 1.7	1.7-2.3	> 2.3

Child-Pugh score classification - Child A: Score 5-6 (well-compensated); Child B: Score 7-9 (significant functional compromise); Child C: Score 10-15 (de-compensated). INR: international normalized ratio

impaired regeneration, increased risk of operative bleeding, post-operative ascites, and bleeding varices, high portal flow in non-compliant vascular bed, and liver failure.^[16] These risks and post-operative mortality rates are closely related with the reserve of the liver. Nagasue *et al.*^[17] reported the results of major hepatectomies (more than two segments) in cirrhotic patients with the mortalities for Child-Pugh score A, B, and C as 16%, 33%, and 100%, respectively. As a result, the candidates for a surgical resection should be preferably in Child-Pugh Class A.

Intra-hepatic distribution

The curative resection is the only modality that can achieve survival benefits in HCC treatment. However, size and number of the tumors are not the only determinant for the selection of the resectable HCCs. In case of difficult tumor locations, the size of the tumor cannot be the main determinant for

the decision of surgical resection. Contrary, patients with peripherally located large HCCs could be good candidates for a surgical resection [Figure 2].

Stratifying risk factors

In an optimal HCC patient, with a good patient performance, no distant metastasis, a well-compensated liver reserve and a technically feasible tumor for a resection, it has been shown that bilirubin levels and portal hypertension are additional independent survival predictors. It was shown that in Child-Pugh Class A patients, without a portal hypertension and with bilirubin levels < 1 mg/dL compared with the patients with a portal hypertension and bilirubin levels > 1 mg/dL; 5-year survival rates were 74% and 25%, respectively [Figure 3].^[18] In other words, patient who is a good candidate for surgical resection should be in stage Child A and moreover, they should be in a “better” Child A subgroup with a normal bilirubin level and without portal hypertension. The indicators of portal hypertension as splenomegaly, thrombocytopenia, and esophageal varices should be checked.

Hepatectomy size

In a normal healthy non-cirrhotic liver parenchyma, liver resections up to 70% are well-tolerated due to the intact regeneration capacity of the hepatocytes.^[19] The size of the hepatectomy must be as small as “oncologically” possible in HCCs. “The Makuuchi criteria” is an important algorithm for the HCC treatment in cirrhotic patients. These criteria use the

presence of ascites, total serum bilirubin levels, and the ICG disappearance rate for deciding the eligibility of the patients for a resection and the type of the surgical resection. In patients with uncontrolled ascites, bilirubin levels above 2 mg/dL, any type of hepatectomy is contraindicated. The ICG uptake rate in “Makuuchi criteria” is used as objective criteria for deciding the extent of the resection that can be safely performed. According to the ICG uptake resections, that can be safely performed are classified as, major hepatectomy (ICG < 10%), segmentectomy < 1/3 of liver (10% < ICG < 19%), subsegmentectomy < 1/6 of liver (20% < ICG < 29%), and a limited resection (ICG > 30%) [Figure 4].^[20]

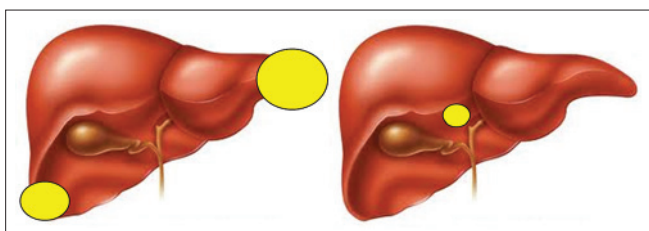


Figure 2: Location may be as important as the number and size of the tumors for technical feasibility of surgical resection

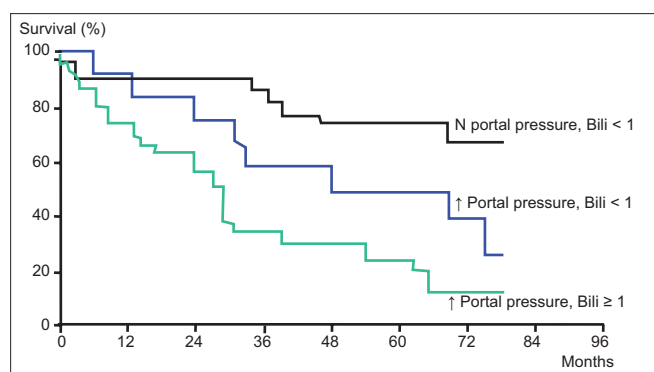


Figure 3: Resection of < 5 cm tumors in Child-Pugh A patients according to the bilirubin and portal hypertension (adopted from Llovet *et al.*^[18])

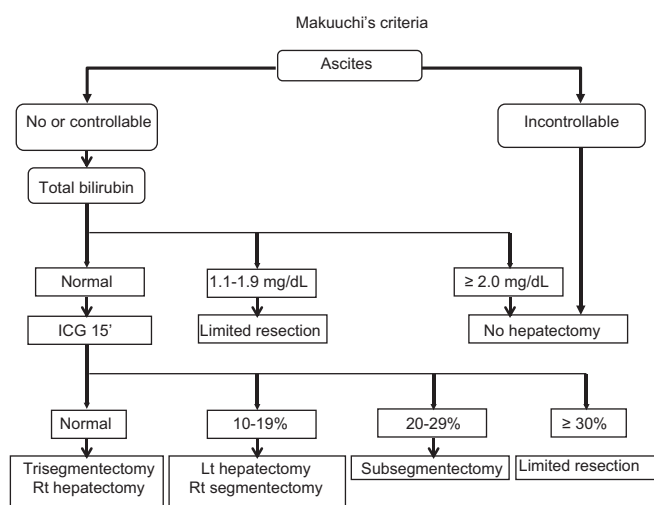


Figure 4: Makuuchi criteria for safe hepatectomy. ICG: Indo-cyanine Green; Lt: left; Rt: right

We have to say that while deciding a surgery for a patient with HCC, we use the BCLC and the other algorithms, as well. To avoid a misunderstanding, we have to highlight that we do not try to create an alternative system to the well-known systems (such as BCLC and others) to evaluate the HCC patients. This mnemonic flowchart may only help in assessing a systematic check of this important clinical decision-making process. Here, we just want to re-read the BCLC and other algorithms from another direction, but more simply and practically in the daily life. In our clinical practice, lots of HCC patients are referred to our department for the aim of resection from other cities by several clinicians. We observed that most clinicians (surgeons, but not an expert on liver surgery, oncologists, gastroenterologists, or internists) focus only on the size or number of the tumors in the liver while they were referring their patients. However, the general condition of the patient (mostly bedridden or not), bone pains (the possible metastasis), platelet counts, or presence of esophageal varices, *etc.*, can be overlooked before the transfers of the patients. Sometimes the simplest points are missing in the complex algorithms. “PERISH” flowchart can be used as a simple checklist in the clinical evaluation of the patients with HCC. This mnemonic flowchart could be more useful for the clinicians who are not experts on HCC. We believe that an easy learning method for the selection of the most appropriate candidates for surgical resection can create a charm among the non-expert clinicians on HCC, as well. This mnemonic can make the evaluation of the HCC patients more attractive due to its simplicity.

CONCLUSION

Asking for the patients’ general condition, that is, whether the patient is symptomatic and in bed > 50% of the day, should be the first question to select the correct cases for the resectable HCCs. Following this, asking for suspicious metastasis as bone pain and radiological evaluation of the abdomen and thorax is mandatory. Calculation of the Child-Pugh score is only the third step of the evaluation. Good candidates for a surgical resection should be Child-Pugh “A” but a better subgroup “A” with normal bilirubin levels should be preferred. Technical feasibility of the resection according to the intra-hepatic distribution of the tumor(s) should be done radiologically, and the patients preferably should not have portal hypertension. If the patient fulfills all the previous steps, the surgeon can perform the ICG clearance test, if necessary [Table 3].

As a result, following the “PERISH” flowchart in the treatment of any HCCs may prevent “perish” of the surgeons while deciding the appropriate treatment of HCCs.

Table 3: PERISH flowchart

PERISH flowchart

Performance of the patient (ECOG)
Extra-hepatic disease (metastasis)
Reserve of the liver (Child-Pugh score)
Intra-hepatic distribution (CT)
Stratifying risk factors (portal hyper-tension and bilirubin)
Hepatectomy size (Makuuchi-ICG)

ECOG: Eastern Cooperative Oncology Group; CT: computed tomography;
ICG: Indo-cyanine Green

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Conflict of interest

There is no conflict of interest.

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