Editorial

Small hepatocellular carcinoma: which criteria for liver transplantation?

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Hepatocellular carcinoma (HCC) is the most common hepatic tumor and the best options for treatments are liver resection and liver transplantation. Many new locoregional treatments are available for HCC. Of them, radioembolization is the most discussed innovative one (1-3). Liver transplantation has the advantage to cure both tumor as well as the underlying cirrhosis and is the ideal treatment for HCC in cirrhotic liver.

The article of Kamo *et al.* entitled "*Liver transplantation for small hepatocellular carcinoma*" (4), is an interesting study based on a cohort of 223 patients who underwent LT for HCC at Kyoto University Hospital. Authors suggest using Kyoto criteria (KC) for LT for HCC. KC consists of three independent factors: tumor number <10, maximal diameter of each tumor <5 cm and des-gamma-carboxy prothrombin (DCP) serum <400 mAU/mL. Finally, 159 patients were enrolled in the study with small HCC. In 69% of cases a preoperative treatment was performed as hepatic resection or locoregional treatment, 78% of cases met the Milan criteria (MC) and 83% met the KC.

Twenty years after the MC introduction, they are still the most criteria selection used worldwide (5). However, the time is arrived for a new revolution based on a "blended" management and selection approach. New criteria integrating HCC morphology and biology are strongly needed with the intent to "capture" all of them (6).

Kamo *et al.* described no difference of overall survival in case of patients within or beyond MC, less recurrence rate within MC. Surprisingly when authors used the KC, the survival was higher in patients within KC and recurrent rate was minor. These important results demonstrate that MC need to be modulated according to the biology of the HCC. Moreover in case of pretreatment a trend of more recurrence rate was observed in those patients. An intention-to-treat survival benefit of liver transplantation in patients with HCC suggests stratifying patients and in case of no benefit patients should be de-listed (7). To better expand criteria and to obtain best overall and free recurrence rates, the proposed KC seems to be very helpful. However, the importance of DCP in the refinement of the eligibility criteria of HCC patients for LT was not confirmed in a recent meta-analysis (8). Nevertheless, the analysis was based on Japanese studies performed in the setting of living-donor LT only, needs further validation in the Western world both in the setting of post-mortem and living-donor LT.

Moreover, in the presented cohort 61% of patients had HCV cirrhosis which will disappear in few years. In this evolving etiology of hepatitis and HCC surgical resection may be the first therapeutic option in these patients. And the evolution of minimally invasive approach even in patients with cirrhosis is the good option (9).

In Western world due to the current organ shortage, a repeat resection for recurrent HCC might be considered as the best alternative option to liver transplantation (10).

Summary, LT for HCC is growing and needs to rewrite criteria based not only on morphological criteria but based on the tumor biology.

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