Commentary

Surgery is the means of treatment, but high-quality survival is the ultimate goal

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Liver resection is the most effective treatment for primary liver cancer or colorectal liver metastasis (CRLM). Systemic chemotherapy, targeted therapy, immunotherapy, and local treatments are selectively performed to improve long-term survival. However, most patients have irresectable tumors at the time of diagnosis. One of the main factors affecting resection is insufficient postoperative future liver remnant (FLR) (1). To address this issue, various methods have been proposed to promote the hyperplasia of FLRs. Portal vein embolization (PVE), proposed by Makuuchi *et al.* (2) in 1990, involves the embolization of the portal vein on the tumor side via interventional methods to increase blood inflow to the contralateral portal vein. A hepatectomy of the affected side can then be performed after the development of sufficient FLR hyperplasia. However, the main problem of PVE, which is currently the standard technique to increase FLR hyperplasia before major hepatectomy, is the relatively long waiting time, and the resultant liver hyperplasia is unsatisfactory in some patients (3). Associating liver partition and portal vein ligation for staged hepatectomy (ALPPS), first reported by Schnitzbauer *et al.* (4) in 2012, can promote relatively rapid hyperplasia of FLR and render more patients' livers resectable in a shorter time. However, ALPPS remains controversial because of its high rates of perioperative mortality and complications, such as bile leakage and septicemia (5).

We read with interest the article by Sparrelid *et al.* (6), who used multicenter data to compare the rate of successful resection and liver hypertrophy between upfront ALPPS and PVE with rescue ALPPS on demand for CRLM. The authors concluded that upfront ALPPS had a higher rate of successful resection than PVE with rescue ALPPS, but the difference was not statistically significant (84.5% *vs.* 73.3%, respectively; P=0.080), and that the latter resulted in significantly greater hypertrophy of FLR than the former (96% *vs.* 71%, respectively; P=0.010).

Research has shown that ALPPS promotes more rapid FLR hyperplasia in CRLM than primary liver cancer, and the period of most rapid hyperplasia occurs within the first week after surgery (7). In one study, the average waiting time between the 2 steps were 2 weeks, which was shorter than the 5.7-week waiting time for PVE alone (8). Studies on ALPPS have shown that improvements in operating techniques have increased the rate of successful resection and reduced the mortality rate (9,10). However, few studies have examined whether ALPPS leads to better overall survival than PVE or PVE with rescue ALPPS. Additionally, research indicates that patients older than 60 years do not benefit from ALPPS (10). The rate of successful resection should not be the ultimate goal of treatment, but only one part of it. The ideal ultimate goal is to downstage the tumor and transform it into a resectable lesion through comprehensive therapies and then resect the CRLM or primary liver cancer. Systematic treatments are necessary throughout the entire process to improve the prognosis. Improving the patient's quality of life and reducing serious surgical complications are also quite important treatment goals. PVE results in slower FLR hyperplasia than ALPPS; however, it has 2 major advantages. First, the interventional procedure is less invasive, especially for older patients and those with a relatively poor constitution. Second, personalized

comprehensive treatment for the primary tumor can be applied while waiting for FLR hyperplasia to develop. The close surveillance of lesions on the liver not only helps to determine the effect of anti-tumor drugs but also avoids unnecessary secondary liver resection.

The appropriate patient selection for ALPPS or PVE is also very important. For patients with standardized FLR (sFLR) of <20%, neither procedure is ideal. ALPPS can be performed in patients with sFLR of 20–30%, while PVE should be the first choice (and is safer than ALPPS) in patients with sFLR of 30–40%. When liver hyperplasia is insufficient after PVE, ALPPS can be selected as a rescue procedure (9).

The article by Sparrelid *et al.* (6) only compared the rate of successful resection and FLR hyperplasia between the 2 treatments, and did not compare overall survival, which is the most important treatment goal.

Improving the rate of successful liver resection is a goal of treatment, but it is not the ultimate goal. The ideal and overall treatment goal for patients is to achieve high-quality survival using from less to more invasive means of FLR modulations. Implementing PVE first followed by rescue ALPPS on demand is a safer and more effective measure and should be considered the more appropriate procedure for promoting FLR hyperplasia for CRLM or primary liver cancer.

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