



Laparoscopic liver resection in the aging society

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We have read the article of Goh *et al.*, titled “Perioperative outcomes of laparoscopic minor hepatectomy for hepatocellular carcinoma in the elderly,” published in the *World Journal of Surgery* (1). We would like to commend the authors for their interesting analyses on the outcomes of minor laparoscopic liver resection (LLR) for hepatocellular carcinoma (HCC) among elderly patients. Their study discussed two main analyses: minor LLR, performed in 40 consecutive elderly (≥ 70 years) patients and 94 young patients (< 70 years), and open liver resection (OLR), performed in 85 elderly patients.

First, elderly patients and young patients who had undergone minor LLR for HCC were compared. The elderly patients were found to be significantly more likely to have comorbidities, an ASA score > 2 , a previous liver resection, and a larger tumor size. Further, perioperative outcomes showed that the elderly patients were significantly more likely to have a longer operation time, an increased amount of blood loss, an increased need for blood transfusion, a longer Pringle duration, and a longer postoperative hospital stay. They discussed that it was more difficult for anesthesiologists to maintain a low central venous pressure in elderly patients during surgery, which could be because of the higher incidence of comorbidities, such as cardiac diseases or pulmonary disorders, among these patients. We agree with the reasonable and evocative opinions presented in the study by Goh *et al.* Worse cardiac function results in an increase in central venous pressure, and a worse respiratory function leads an increase in intraoperative airway pressure. These comorbidities cause an increase in hepatic venous pressure and bleeding during liver parenchymal transection (2). However, contrary to

these results, some previous articles have reported that age of the patients is not correlated to operative time or blood loss (3-5). The reasons for this may be that bleeding caused by comorbidities does not apply to all elderly patients, and the factors associated with operative outcomes of LLR, e.g., tumor size, number, location, extent of resection, liver cirrhosis, and patient characteristics, are varied (5-8). Of course, the results of this study by Goh *et al.* are highly suggestive. Therefore, surgeons should pay attention not only to tumor factors but also to the past histories and comorbidities of individual patients.

Second, minor LLR and minor OLR in elderly patients were compared using the propensity score-matching method. Minor LLR was found to be associated with a decrease in pulmonary complications and a shorter length of stay at the expense of an increase in blood loss and a longer operation time. The findings of a decrease in pulmonary complications and a shorter length of postoperative hospital stay are in accordance with the findings of previous studies (4,9-16). However, we do not understand the reason for the increase in blood loss with LLR compared with OLR if the tumor and patient characteristics were properly matched using the propensity score-matching method. We believe that the number of patients in this study was too small to apply propensity score matching. Several retrospective studies using propensity score matching, meta-analyses, and systematic reviews have shown lower blood loss with LLR than with OLR (4,11-17). Theoretically, the pneumoperitoneum offers the advantage of reduced venous bleeding during liver parenchymal transection. Therefore, we do not agree with this result of the study by Goh *et al.*, although the authors state that previous studies did not

focus on minor LLR in elderly patients with HCC.

In almost every country, the number of elderly people is increasing as a result of a longer life expectancy. With ageing, adults face major burdens of disability and death from various diseases, such as heart disease, stroke, chronic respiratory disorders, and cancer. Elderly people are also at a much greater risk of developing more than one chronic condition simultaneously than are younger people. However, according to an international survey by Halls *et al.*, few surgeons considered the fact that age increases the surgical difficulty of LLR (18). Of course, surgeons have concerns regarding postoperative complications, which are highly correlated to patient age-related comorbidities but may not focus on age itself. Particular attention should be paid to bleeding during LLR in elderly patients with cardiac or pulmonary disorder because of higher central venous pressure, and the article by Goh *et al.* has emphasized on this aspect.

Additionally, the laparoscopic approach reduces surgical wall trauma, resulting in decreased postoperative pain and early postoperative rehabilitation. Thus, LLR contributes to less postoperative complications and a shorter postoperative hospital stay than with OLR (9,10,13,14,16). Therefore, the laparoscopic approach has a potential role in overcoming frailty among elderly patients. However, there are only a few studies on laparoscopic hepatectomy for elderly patients; thus, further larger-scale studies are required in order to confirm these findings.

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