



Editorial on “*Laparoscopic versus open liver resection for hepatocellular carcinoma in elderly patients: a propensity score matching analysis*”

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We read with great interest the article of Delvecchio *et al.* published in a recent issue of *HPB* journal (1). The authors compared short- and long-term outcomes of laparoscopic and open liver resection (OLR) in elderly patients with hepatocellular carcinoma (HCC) using 1-1 propensity score matching (PSM).

The first laparoscopic liver resection (LLR) was reported in 1992. Since then, LLR has been increasingly reported as an option for surgical resection, and its application has increased worldwide (2). Several studies have reported that LLR results in shorter hospital stay, reduced blood loss, fewer complications, and earlier postoperative recovery than OLR (3–6). Furthermore, a meta-analysis of comparative studies has shown favorable short-term and long-term survival in LLR (4). Compared with younger patients, older patients may present with more comorbidities therefore their operative course needs closer attention. Several authors have reported poorer survival in elderly patients than in younger patients (7). Nonetheless, several reports have indicated that OLR for older patients with HCC is safe and feasible (8,9).

In this study, the authors showed that LLR is safe and feasible in elderly (≥ 70 years) patients and is associated with good short-term outcomes compared to OLR. Authors reported lower Clavien–Dindo grades III/IV in the laparoscopic than in the open matched group. Hospital stay was also shorter in the laparoscopic group. There were no significant differences between laparoscopic and open groups regarding overall survival and disease-free survival at

1-, 3- and 5-year.

We believe that certain aspects of this study are open to further discussion and analysis.

The study period spanned over 10 years (2009–2019) and LLR was only increasingly performed over the latter period (2014–2016 and 2017–2019). The results observed could have been confounded by changes and improvements in perioperative care and practices. It would have been interesting to know if the selection criteria, perioperative as well as postoperative outcomes had been similar between the first and second 5-year period.

Due to its retrospective nature, despite the use of PSM analysis, biases and confounding factors are likely to persist in the absence of randomization. This is especially true when authors state having excluded R2 resections, which may have been higher in the elderly group.

As far as the selection criteria between laparoscopic and open approaches are concerned, the tumour location and the preferences of the surgeon could induce biased results. Indeed, information on which segments were interested was not provided. As shown by Ban *et al.*, among various clinical factors, the extent of liver resection and tumor location were shown to be important factors in the difficulty of the laparoscopic surgery (10). In “The Louisville Statement, 2008”, resection of the posterosuperior segment was regarded as a major hepatectomy because of its technical difficulty while resection of the right posterosuperior part of the liver requires the most advanced laparoscopic technique (11). There were 135 (33%) patients with tumors located in the

posterosuperior segments who underwent OLR before the PSM and 50 (23%) patients after the PSM.

Moreover, the percentage of major liver resection, decreased from 36% to less than 20% in both OLR and LLR after PSM. It is likely that the authors results and observations may be applicable mainly for minor liver resection in the elderly population.

Authors do not provide certain details of the surgical technique that could be important for evaluating the role of laparoscopy in the elderly. No information was given on preoperative chemoembolization, radiofrequency ablation, or percentage of conversion from laparoscopic to open surgery. As it has been already shown by Shin *et al.*, patients who experienced unplanned conversion during LLR showed poor perioperative and long-term outcomes compared to those who underwent planned laparoscopic and OLR (12).

Finally, instead of a PSM analysis, authors could have used coarsened exact matching (CEM), which identifies exact matches between patients assigned to laparoscopic or OLR and hence could have minimized imbalance and confounding bias (13).

In conclusion, results of this study are very relevant as they highlight the role of minimally invasive surgery in frail patients. Despite selection biases, it seems that patients with well-located tumors submitted to minor hepatic resection have better outcomes after laparoscopic than after OLR. However, further prospective studies are needed.

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Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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