



# Laparoscopic liver resection for hepatocellular carcinoma: patient selection is key

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*Comment on:* Stiles ZE, Glazer ES, Deneve JL, *et al.* Long-Term Implications of Unplanned Conversion During Laparoscopic Liver Resection for Hepatocellular Carcinoma. *Ann Surg Oncol* 2019;26:282-9.

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There has been a significant increase in the interest and utilization of laparoscopic liver surgery over the past decade. This minimally-invasive approach offers the benefit of smaller incisions with purported benefits of reduced blood loss and potentially decreased perioperative morbidity and mortality (1). Perhaps equally as important with the ongoing opioid crisis, a laparoscopic approach may result in reduced pain and therefore be seen as an “opioid-sparing” technique. As such, we read with great interest the current study by Stiles and colleagues in the *Annals of Surgical Oncology* evaluating the long-term impact of unplanned conversion during laparoscopic liver resection for hepatocellular carcinoma (HCC) (2). In this population-based study, the authors utilized the National Cancer Database (NCDB) to identify patients who underwent a laparoscopic liver resection for HCC. Using propensity-matched score matching, the authors found that patients who experienced an unplanned conversion during laparoscopic liver resection for HCC had inferior overall survival as compared to patients who did not experience an unplanned conversion. Furthermore, the authors found that an unplanned conversion resulted in worse overall survival as compared to patients undergoing an open approach. Given the increasing utilization of laparoscopy for liver resection, these data have important implications on patient selection for this approach. However, as with any large retrospective database study, a number of important factors need to be considered.

Several previous studies have established the safety and feasibility of laparoscopic hepatectomy for patients with HCC (1,3-5). In fact, previous population-based studies have been published showing an improvement in short- and long-term outcomes among patients undergoing a minimally-invasive approach (1,6,7). We commend the authors for addressing an issue not previously reported—the impact of an unplanned conversion. Through the use of propensity-matched scoring, the authors aimed to mitigate selection bias in their results by balancing measurable confounding factors between the respective cohorts. Though this statistical approach is sound, this approach can only control for confounding variables that are included in the dataset. As such, several factors that have been previously shown to impact long-term outcomes for patients with HCC were not included in the analysis and should be considered when interpreting the data.

The important patient factor of body mass index was not included in the analysis. This has important implications as obesity has been shown to be a key factor influencing short- and long-term outcomes following laparoscopic liver surgery (8,9). From a technical standpoint, a higher body mass index often inherently increases the complexity of a laparoscopic approach. Patients with a higher body mass index are also at increased risk for underlying liver disease from nonalcoholic steatohepatitis. This factor, along with other factors associated with underlying liver disease, were not accounted for. These have significant implications

on the authors' conclusion, as the degree of liver disease (cirrhosis, portal hypertension) have a direct impact on long-term outcomes among patients with HCC. As the primary outcome of this study was long-term survival, we believe the lack of these data may potentially influence the conclusions of the study. As seen in the Kaplan-Meier figures, patients with and without an unplanned conversion had overlapping survival curves in the first 6 months following diagnosis. Thus, it is reasonable to hypothesize that the differences in long-term survival between these cohorts was due to other factors such as a non-HCC related death, worse tumor biology, or worse underlying liver disease and not the occurrence of an unplanned conversion. In addition, the reason for unplanned conversion was not available in the dataset. We commend the authors for acknowledging that the reason for unplanned conversion has been shown to impact outcomes. Specifically, unplanned conversion for an adverse intraoperative event (i.e., Massive hemorrhage) have inferior outcomes as compared to surgeons who converted for more nonthreatening reasons (i.e., failure to progress) (10). Thus, in addition to careful patient selection, surgeon decision making is paramount in the safety and effectiveness of a minimally-invasive approach for laparoscopic liver surgery.

Finally, we commend the authors for including hospital case volume in the analysis. However, surgeon case volume was not accounted for, as this metric is not collected in the NCDB. Particularly with minimally-invasive hepatopancreatobiliary surgery, there has been a clear association with case volume and clinical outcomes—i.e., a learning curve (11). In fact, several experts recommend a graduated approach to laparoscopic liver surgery, beginning with minor wedge resections for small isolated lesions and graduating to more technically challenging tumors. Specifically, Louisville, Morioka, and Southampton consensus statements have established guidelines on the indications and technical guidelines for minimally-invasive laparoscopic liver surgery (12-14). Supported by the current data, “who” to operate on and “by whom” are both important factors when considering a laparoscopic approach for the resection of HCC.

In conclusion, we believe that patient selection and surgical judgement are key in the safe and effective minimally-invasive treatment of HCC. Though unplanned conversions for an adverse intraoperative event may result in worse clinical outcomes, we urge readers to interpret the data cautiously with respect to its impact on long-term outcomes. We agree with the authors that major hepatic

resection via a laparoscopic approach should be reserved for cases with a high likelihood of success and be performed by experienced minimally-invasive liver surgeons.

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## Footnote

*Conflicts of Interest:* The authors have no conflicts of interest to declare.

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