



Shades of 'Childs A': successful laparoscopic major hepatectomies in cirrhotics

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Comment on: Yoon YI, Kim KH, Kang SH, *et al.* Pure Laparoscopic Versus Open Right Hepatectomy for Hepatocellular Carcinoma in Patients With Cirrhosis: A Propensity Score Matched Analysis. *Ann Surg* 2017;265:856-63.

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Progress in laparoscopic liver resection (LLR) has accelerated over the last twenty years since the first reported procedures in the early 1990s (1). While LLR is most commonly utilized in left sided non-anatomic resections and left lateral sectionectomy, laparoscopic major hepatectomy has been shown to be feasible in selected cases (2-4). Even considering the technical complexity and costly instrumentation required, LLR has demonstrable benefits in morbidity, hospital stay, pain control, and overall cost (5-7). Furthermore, there is growing proof of non-inferiority when compared to open approach in oncologic outcomes (8). And though there has been broad progress with the techniques of LLR overall, there is still much less experience with LLR in cirrhosis. Transection of the fibrotic parenchyma is particularly difficult, especially in the setting of portal hypertension and impaired coagulation. In addition, these patients are known to be at higher risk for postoperative complications, including hepatic insufficiency. While LLR in cirrhosis is reported to be safe, particularly if technical modifications are made, the available case series are modest in size and there remains relatively little data overall compared to that available for LLR in non-cirrhotics (9,10).

In their May 2017 *Annals of Surgery* article, Yoon & colleagues describe their experience with laparoscopic formal right hepatectomy in patients with hepatocellular carcinoma (HCC) and cirrhosis (11). The authors report 37 laparoscopic right hepatectomies over a seven year period. Among these, 33 with viral hepatitis were one-to-one case matched using propensity scoring from a cohort of

115 open right hepatectomies performed during the same period. Their analysis focused on morbidity as the primary endpoint, with operative details and oncologic outcomes as secondary endpoints. After propensity score matching, there were no significant reported differences between the groups (33 LLR *vs.* 33 open) in terms of complications, disease free survival, or overall two-year mortality. Blood loss and need for transfusion were also the same between the groups. LLR demonstrated an advantage in postoperative pain and hospital length of stay. Predictably, operative time was longer for laparoscopic cases, but the authors did comment on the decrease in OR time average by two hours when comparing their first 10 to last 10 cases.

This is an impressive series. Laparoscopic formal right hepatectomy in the setting of cirrhosis is a formidable technical achievement. Their contribution adds a robust series to a relatively small body of literature, and they are to be commended for the breadth of their experience and careful analysis. In restricting their analysis to pure laparoscopic right hepatectomy for a single disease, they have reduced the heterogeneity (technical, patient, tumor, and physiologic) that is a stumbling block of most reported series of LLR. Their reported outcomes are outstanding.

Nonetheless, this retrospective series still suffers the flaws that are inherent to any retrospective analysis, even with a valiant effort at propensity matching. All liver surgeons with experience in cirrhotics know that, whatever the scoring system or stratification used, there is still tremendous variability among compensated cirrhotics. A key question in reading this manuscript is whether their

findings are generalizable: do these patients look like my cirrhotic patients? In this series, all patients had Grade IV fibrosis and were classified as Childs-Pugh Class A; however, the authors do not include in their manuscript a preoperative MELD score (increasingly used to try to predict hepatic reserve and risk of resection). Proteins induced by vitamin K absence or antagonism (PIVKA) and indocyanine green (ICG-R15) uptake were used routinely, though these are not available in most American or European centers. At present, there is no single scoring system that accurately characterizes and differentiates among “Child’s A” cirrhotics. But these patients were clearly a “good” group overall. Only 2 of the 33 in the LLR group and 10 of the 115 in the open group required preoperative portal vein embolization. This is a very small percentage of the overall group (given need for formal right in cirrhosis) and suggests remarkably preserved liver function in their patients. Further complicating the generalizability of these findings is the fact that 87% of the LLR were in patients with HCC secondary to chronic hepatitis B. While this is intrinsic to their population, this contrasts sharply to the United States and European populations, where hepatitis C is much more common. HBV and HCV livers look and behave very differently, so this is an important consideration when understanding their success in LLR (and overall commendable results).

Clearly, in anything other than a randomized controlled trial, selection bias occurs. The authors state that “the basic operative criteria for LRH and ORH were similar” and that “LRH was offered to patients with smaller lesions (5 cm), who could choose between LRH and ORH after receiving a comprehensive explanation of the advantages and disadvantages....” But few patients opt for a bigger incision if told it can be safely done laparoscopically. So, the surgeon is largely choosing. This was likely in part due to tumor characteristics—particularly proximity to vasculature and anticipated margin. But it might be due to a number of subtle factors—body habitus, bifurcation vs trifurcation of inflow (the latter more challenging), prior operations, etc. Inclusion of the pathologic characteristics in the pre-propensity matching tables would perhaps give a more candid representation of the cohort and who was indicated for a laparoscopic approach. In LLR, “course correction” during parenchymal transection and control of the surgical margin is inherently more difficult. This has to do in part with instrument rigidity and angle of exposure. Is this reflected in the author’s relative difference in tumor-free margin (though not statistically different)?

Again, it may also point to a subtle indication of selection bias, in that tumors which would be amenable to a clear dissection would more likely be scheduled as laparoscopic cases, whereas a closer margin may be inevitable and better managed during transection with an open approach. Again, inclusion of pre-matched tumor characteristics would help to elucidate this point.

Laparoscopic hemi-hepatectomy in cirrhotic patients is not a procedure that is likely to be widely adopted by many centers in the near future. It is a technical tour-de-force. The very nature of the Yoon manuscript is to argue that their matched cohorts are comparable in an effort to demonstrate the advantages of laparoscopy. Thus, this manuscript does not lend itself to a nuanced discussion of patient selection. Their argument is convincing—in the patients they (carefully chose) to offer the laparoscopic approach, there is a clear reduction in morbidity. But an effort to mimic their remarkably good results will await their (perhaps) next manuscript: “How do you select patients for laparoscopic right hepatectomy in setting of cirrhosis?”

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