Authors' Reply: Bile Leak Reduction with Laparoscopic Versus Open Liver Resection: A Multi-institutional Propensity Score-Adjusted Multivariable Regression Analysis

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We thank Dr. Palumbo and colleagues for the interest in our article, and we appreciate their thought-provoking “Letter to the Editor.” While several of the issues raised in the letter were not specifically addressed in our study, these inquiries demonstrate the need for further studies regarding bile leaks following minimally invasive hepatectomies. The current manuscript reports that minimally invasive liver resection patients had a significantly lower all reason readmission rate of 6.5% compared to 12.3%. Bile leak associated readmission rates were equivalent between the minimally invasive ($n = 3/14$, 21.4%) and the open resection groups ($n = 6/26$, 23.1%). While the incidence of bile leaks was not minimized by the extent of liver resection, our study identified that laparoscopic liver resection did not increase the incidence of bile leaks. Previous studies have shown that ERCP can be an effective treatment option for some post-operative bile leaks following hepatectomy [1, 2]. Currently, varying evidence exists in support of routine intra-operative tests to determine the presence of a bile leak and the best intra-operative test remains unclear [3, 4]. Unfortunately, the lack of a comparator group made this topic outside the focus of our paper, but we believe that it merits further investigation through additional clinical studies specifically evaluating this issue for minimally invasive liver resections. Finally, the literature surrounding the use of fibrin glue to prevent biliary leaks remains heterogeneous with low quality evidence [5, 6]. Recognizing the anecdotal evidence that bile leaks can sometimes

be better identified and addressed after the application of fibrin glue across the transection edge, we agree that this technique requires further evaluation in future studies.

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