Editorial Commentary

# Transforming liver surgery: the shift from traditional resections to minimally invasive and parenchymal-sparing techniques

**Omid Ghamarnejad^, Rizky Widyaningsih^, Gregor Alexander Stavrou^**

Department of General, Visceral, and Oncological Surgery, Klinikum Saarbrücken, Saarbrücken, Germany

*Correspondence to:* Dr. med. Dr. habil Gregor Alexander Stavrou, FEBS (HPB, SurgOnc). Department of General, Visceral, and Oncological Surgery, Klinikum Saarbrücken, Winterberg 1, 66119 Saarbrücken, Germany. Email: gstavrou@klinikum-saarbruecken.de.

*Comment on:* Sousa Da Silva RX, Breuer E, Shankar S, *et al.* Novel Benchmark Values for Open Major Anatomic Liver Resection in Non-cirrhotic Patients: A Multicentric Study of 44 International Expert Centers. Ann Surg 2023;278:748-55.

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We read the recent article by Sousa Da Silva *et al.* (1) with great interest. This study includes one of the largest sample sizes in the field, aimed to establish textbook outcomes for anatomic open major hepatectomies using benchmark method, which allows future researchers to more effectively compare their respective findings.

It is remarkable that only about 36% of over 8,000 cases in the population achieve the status of benchmark cases, demonstrating that liver surgery has evolved, and many patients are offered the best possible treatment, even if they are in a higher risk category. In their study, the authors demonstrated that applying benchmark values for open major hepatectomies yielded the following clinical outcomes: a perioperative major complication rate (Clavien-Dindo grade ≥3a) of ≤46%, post-hepatectomy liver failure (ISGLS grade B-C) rates of <10%, bile leakage (ISGLS grade B-C) of <18%, and a low 3-month mortality rate of <6%. The authors also compared textbook outcomes with outcomes in a cohort of high-risk patients, including those with metabolic/cardiovascular comorbidities, severe obesity, or cirrhosis. As anticipated, cirrhotic patients had significantly higher rates of liver failure (25.2% *vs.* benchmark ≤17.2%) and longer hospital stays (15 days *vs.* benchmark ≤12 days). Additionally, patients with comorbidities or severe obesity experienced worse 3-month mortality rates of 7.4% and 8.0%, respectively, compared to the benchmark of ≤5.7%. These outcomes are consistent with those previously reported in the literature (2,3). While some studies have reported better outcomes for open major hepatectomy across all patient and tumor characteristics, a detailed comparison remains challenging due to limitations such as small sample sizes and heterogeneity in both patient populations and the definitions of major hepatectomies.

Using the findings and benchmark values established by Sousa Da Silva *et al.* (1), we believe that the outcomes for many patients globally can be enhanced, particularly in centers with limited experience in conducting major hepatectomies. Many of the concerns raised by experts in the "Discussant" section of the study were addressed comprehensively. Therefore, in this commentary, we aim to provide an additional perspective.

As the authors also mentioned, there is a current trend toward minimally invasive surgery (MIS) and parenchymal-sparing hepatectomy (PSH) in the field of liver surgery. MIS has introduced significant advancements in the surgical field, providing distinct benefits during and after the procedure compared to traditional open surgery. These advantages include reduced intraoperative blood loss, decreased postoperative pain, lower complication rates, and faster recovery times, even among patients who have

^ ORCID: Omid Ghamarnejad, 0000-0001-7424-1323; Rizky Widyaningsih, 0000-0002-8044-6306; Gregor Alexander Stavrou, 0000-0002-6890-4271.

undergone major hepatectomy (3-5). Furthermore, it has been demonstrated that laparoscopic hepatectomy is a cost-effective option, yielding superior postoperative outcomes and shorter hospitalization compared to open hepatectomy (6). Contrary to expectations, the learning curve for MIS is relatively short, particularly for surgeons with substantial experience in open surgery. In our previous study, we found that the learning curve for laparoscopic complex (major) hepatectomies was approximately 20 cases (7), a finding that has been corroborated by numerous other studies (8,9).

Furthermore, it was previously assumed that PSH is associated with an increased recurrence rate due to the retention of a larger volume of parenchyma from the same segment, which could serve as a potential site for recurrence. However, this theory is no longer considered valid, as recurrences of liver tumors can occur bilaterally and independently (10-13). Therefore, it is unlikely that performing a hemihepatectomy instead of a PSH would significantly reduce the rate and localization of recurrences. Additionally, nearly a decade ago, it was demonstrated that the width of a negative surgical margin following a hepatectomy does not influence survival, recurrence risk, or the site of recurrence (14). Notably, PSH does not adversely affect overall or recurrence-free survival and is regarded as a positive factor for qualifying for re-resection of the liver without increasing the risk of recurrence (12). This challenges the dogma, particularly established for primary liver tumors, and not only for metastatic disease. For these reasons, there is a current trend shifting away from conventional open anatomic major hepatectomies toward MIS and PSH procedures. Given these considerations, we no longer see a strong reason to perform open major hepatectomies, particularly in high-volume centers and benchmark patients, when MIS and PSH can enhance perioperative outcomes without compromising oncological results. Although data for primary cancers are not yet as valid as for metastatic disease, it seems sensible to preserve parenchyma, especially in diseased livers, to safely offer liver resection even to those patients.

We thank Sousa Da Silva *et al.* (1) for their valuable contribution to the field and acknowledge the challenges involved in conducting such a large-scale study. The textbook outcomes presented in this study serve as an important resource for future research in liver surgery. Moreover, the benchmark values provided could be particularly beneficial for less experienced centers or surgeons seeking to establish liver surgery programs. However, it is essential to recognize that the number of high-risk patients is continuously increasing. Therefore, we believe that future studies should focus more on novel techniques, such as MIS and PSH, to further enhance patient outcomes.

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## References

1. Sousa Da Silva RX, Breuer E, Shankar S, et al. Novel Benchmark Values for Open Major Anatomic Liver Resection in Non-cirrhotic Patients: A Multicentric Study of 44 International Expert Centers. Ann Surg 2023;278:748-55.
2. Gadallah EA, Elkomos BE, Khalil A, et al. Central hepatectomy versus major hepatectomy for patients with centrally located hepatocellular carcinoma: a systematic review and meta-analysis. BMC Surg 2023;23:2.
3. Kasai M, Cipriani F, Gayet B, et al. Laparoscopic versus open major hepatectomy: a systematic review and meta-

analysis of individual patient data. Surgery 2018;163:985-95.
4. Haney CM, Studier-Fischer A, Probst P, et al. A systematic review and meta-analysis of randomized controlled trials comparing laparoscopic and open liver resection. HPB (Oxford) 2021;23:1467-81.
5. Shi Z. Laparoscopic vs. open surgery: A comparative analysis of wound infection rates and recovery outcomes. Int Wound J 2024;21:e14474.
6. Koh YX, Zhao Y, Tan IE, et al. Comparative cost-effectiveness of open, laparoscopic, and robotic liver resection: A systematic review and network meta-analysis. Surgery 2024;176:11-23.
7. Ghamarnejad O, Sahan LA, Kardassis D, et al. Technical aspects and learning curve of complex laparoscopic hepatectomy: how we do it. Surg Endosc 2024;38:4583-93.
8. Sultana A, Nightingale P, Marudanayagam R, et al. Evaluating the learning curve for laparoscopic liver resection: a comparative study between standard and learning curve CUSUM. HPB (Oxford) 2019;21:1505-12.
9. Chiow AK, Lee SY, Chan CY, et al. Learning curve in laparoscopic liver surgery: a fellow's perspective. Hepatobiliary Surg Nutr 2015;4:411-6.
10. Ghamarnejad O, Stavrou GA. Parenchyma sparing or Anatomical Resections for Colorectal Liver Metastases? Zentralbl Chir 2022;147:381-8.
11. Matsumura M, Mise Y, Saiura A, et al. Parenchymal-Sparing Hepatectomy Does Not Increase Intrahepatic Recurrence in Patients with Advanced Colorectal Liver Metastases. Ann Surg Oncol 2016;23:3718-26.
12. Mise Y, Aloia TA, Brudvik KW, et al. Parenchymal-sparing Hepatectomy in Colorectal Liver Metastasis Improves Salvageability and Survival. Ann Surg 2016;263:146-52.
13. Stavrou GA, Ghamarnejad O, Oldhafer KJ. Why are too few patients with colorectal liver metastases submitted to resection? Chirurg 2021;92:736-41.
14. Pawlik TM, Scoggins CR, Zorzi D, et al. Effect of surgical margin status on survival and site of recurrence after hepatic resection for colorectal metastases. Ann Surg 2005;241:715-22, discussion 722-4.

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