

ASO Author Reflections: The Role of Robotic Surgery in Liver Resection

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PAST

Recent data have unambiguously shown that minimally invasive liver resection, compared with open resection, benefits patients with respect to postoperative complications and length of stay.¹ Surprisingly, therefore, from a clinical perspective, minor resections of the posterosuperior hepatic segments (1, 4A, 7, 8) are nowadays performed via laparotomy in most hospitals around the world. The slow adoption of minimally invasive surgery for these indications is possibly due to the technical difficulties that arise with conventional laparoscopy as these resections often require a curvilinear transection plane that is misaligned with the laparoscopic visual and working axis. The robotic system offers a potential solution. The technically enhanced ‘wristed’ robotic instruments allow for optimal surgical dexterity. Whereas several single-center case series encompassing all types of liver resection have suggested that robotic resections of posterosuperior resection are feasible,² a larger dataset from multiple, international hospitals for this specific indication is still lacking.

PRESENT

We hypothesized that this novel approach for liver resection of the posterosuperior segments results in shorter hospital stay, with similar perioperative outcomes, compared with open resection. We compared open resection with robotic liver resection for minor resections (less than four segments) of the posterosuperior segments (1, 4A, 7, 8). Data from four centers were collected, and, after propensity score matching, 31 robotic and open resections were compared. The primary outcome, i.e. length of hospital stay, differed significantly in favor of the robotic approach—4 days (interquartile range [IQR] 3–7) for the robotic group, versus 8 days (IQR 6–10) for the open group ($p < 0.001$). Postoperative complications and readmissions were similar in both groups, and there was no mortality in either group.³ These results show that a robotic approach to minor liver resections of the posterosuperior segments displays several benefits, including a shorter length of stay, than an open approach in selected patients at expert centers. The use of robotic technology possibly extends indications for minimally invasive liver resection.

FUTURE

Currently, despite benefits regarding the use of robotic technology, several barriers to the widespread adoption of this technique remain. First, the robotic operations in this study require a high level of training and skill; the study’s surgeries were performed by highly skilled hepatobiliary surgeons. Further studies are needed to investigate the learning process and learning curve of robotic liver resection for the next generation of surgeons adopting this technique. Second, larger prospective series would be needed to validate this approach. Third, access to robotic technology would need to be expanded, while per procedure costs are reduced due to market competition. At the

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same time, technological advances, such as integrated augmented reality navigation and molecular targeted fluorescent imaging, will need to be evaluated to further enhance the capabilities of robotic liver surgery.

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REFERENCES

1. Fretland AA, Dagenborg VJ, Bjornelv GMW, et al. Laparoscopic versus open resection for colorectal liver metastases: the OSLO-COMET randomized controlled trial. *Ann Surg*. 2018;267(2):199–207.
2. Nota CL, Borel Rinkes IH, Molenaar IQ, van Santvoort H, Fong Y, Hagendoorn J. Robot-assisted laparoscopic liver resection: a systematic review and pooled analysis of minor and major hepatectomies. *HPB (Oxford)*. 2016;18:113–20.
3. Nota CL, Woo Y, Raoof M, et al. Robotic versus open minor liver resections of the posterosuperior segments: a multinational, propensity score-matched study. *Ann Surg Oncol*. Epub 17 Oct 2018. <https://doi.org/10.1245/s10434-018-6928-1>.