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Mini-invasive Surgery

Editorial

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Minimally invasive liver surgery - rise of a new era

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Minimally invasive surgery (MIS) has improved the perioperative risk, hospital stay, and patient satisfaction with operations for lung cancer, colon cancer, and prostate cancer. Hepatobiliary surgery has been more cautious in integrating minimally invasive approaches due to concerns for the quality of oncologic resection and safety. Over the last 20 years, considerable advances have been made demonstrating comparable safety and oncologic efficacy in minimally invasive liver surgery. This special edition of MIS seeks to describe the recent advances to improve safety and efficacy in minimally invasive approaches, as well as novel strategies to consider for future procedures.

Prior clinical studies have demonstrated that laparoscopic liver surgery can provide safe and equitable results when compared with open liver resections[1]. In a meta-analysis reviewing over 9000 MIS liver surgery cases, laparoscopic surgery was associated with fewer complications, less blood loss, fewer transfusions, and shorter hospital stay[2]. This was achieved without significantly increasing the length of operative time, either for minor or major resections. However, laparoscopic liver surgery should not be utilized by low-volume or inexperienced providers. Review of our institution's experience with laparoscopic liver resection from 2001 to 2017 suggests a significant improvement in operative time, blood transfusions, use of pure laparoscopic approach, and post-operative complications over a 15-year period of implementation and optimization[3]. Further, surgeons should be familiar with practice guidelines for improving operative safety, including anatomic landmarks, strategic approaches for dissection (i.e., Glissonian approach, hepatic vein guided approach), and trouble-shooting when encountering issues with dissection and bleeding[4].

Robotic surgery has been utilized in multiple centers as an alternative to the laparoscopic approach in MIS[5]. This was further examined in a retrospective, multi-center, international study comparing robotic- and laparoscopic-assisted liver resection for metastatic colorectal cancer[6]. Here, robotic surgery was used largely for single segment or wedge resections in patients who had undergone neoadjuvant systemic therapy prior to liver resection. There was no difference in perioperative morbidity, mortality, length of hospital stay, readmission, or margin status. At 5-year follow-up, there was no difference in disease-free or overall survival[6]. These findings were recapitulated in a meta-analysis evaluating laparoscopic versus robotic liver surgery. No difference in operative time, blood loss, conversion to open procedure, perioperative mortality, and complication rate was noted[7]. This suggests that robotic surgery can provide safe and comparable care for patients when compared with laparoscopic procedures at expert centers.

The advent of laparoscopic ultrasound has been helpful in facilitating the transition from open to laparoscopic procedures. Newer technologies such as indocyanine green (ICG) localization offer new adjuncts for guiding anatomic minimally invasive liver surgery resections[8]. Recent findings suggest that ICG can be safely integrated into MIS liver procedures without adding significant operative time or safety risk to the patient[9]. A recent meta-analysis suggests that perioperative ICG staining can facilitate laparoscopic anatomical liver resection using either positive or negative staining techniques[9].

In this special issue of *MIS*, we discuss topics at the frontier for minimally invasive liver surgery. These include resection of posterior liver segments, laparoscopic ALPPS (associated liver partition and portal vein ligation for staged hepatectomy) procedure, resection for HCC, ultrasound technique, ICG-guided resection, and integrating robotic surgery for major hepatectomy.

DECLARATIONS

Authors' contributions

Made substantial contributions to the conception and design of the study and performed data analysis and interpretation: Lo W, Geller DA

Performed data acquisition, as well as providing administrative, technical, and material support: Lo W, Geller DA

Availability of data and materials

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All authors declared that there are no conflicts of interest.

Ethical approval and consent to participate

Not applicable.

Consent for publication

Not applicable.

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