



# A novel retroperitoneal approach to posterior right segment hepatic tumors

Iswanto Sucandy, Gabriel Rivera-Espineira

Digestive Health Institute, Advent Health Tampa, Tampa, FL, USA

Correspondence to: Iswanto Sucandy, MD, FACS. Associate Professor of Surgery, 3000 Medical Park Drive, Suite 500, Tampa, FL 33613, USA.

Email: iswanto.sucandy@Adventhealth.com.

Comment on: Alesina PF, Walz MK. A New Minimally Invasive Approach to the Posterior Right Segments of the Liver: Report of the First Two Cases. *J Laparoendosc Adv Surg Tech A* 2019;29:943-8.

Received: 02 January 2020; Accepted: 29 January 2020; Published: 15 April 2020.

doi: 10.21037/ls.2020.01.02

View this article at: <http://dx.doi.org/10.21037/ls.2020.01.02>

Since the first report of laparoscopic minor liver resection in 1992 by Gagner *et al.*, there has been growing enthusiasm to adapt the emerging minimally invasive techniques to liver surgery for benign and malignant tumors (1). Laparoscopic liver resection has been validated in a prospective randomized control trial from Oslo University Hospital in 2018 to be associated with significantly less postoperative complications (cardiopulmonary events and wound/deep space infection) compared to traditional open liver resection (2). The rate of free resection margins was the same between patients undergoing laparoscopic and open resection. Laparoscopic resection was also cost-effective compared to open resection with a 67% probability. Therefore, continued implementation of laparoscopic liver resection is supported worldwide.

Surgeons, however, face technical challenges to adopt and master techniques of laparoscopic liver surgery due to inherited limitations of conventional laparoscopy (3). Laparoscopic liver surgery requires expertise in both liver surgery and advanced minimally invasive surgery, which is lacking in previous/older generation of surgeons. Tumors located in the posterior right segments (segment 7 and 8) are especially difficult to reach transabdominally using straight laparoscopic instruments. Several technical modifications to facilitate access to this area have been proposed, with a common goal of achieving parenchymal sparing liver resection. Removing the entire right hemiliver to resect a single segment 7 liver tumor is no longer acceptable in modern era of liver surgery. To address the posterior right segment liver tumors, placing the patient in

left lateral decubitus position, use of flexible tip laparoscope to improve visualization over the liver dome, placement of intercostal trocars, use of hand-assisted technique to mobilize the right hemiliver, and more recently trans-thoracic/trans-diaphragmatic approach have all been discussed in scientific conferences and published in the literatures (4-6). Pros and cons of each technique have been debated among experts.

Alesina and Walz in their report from University of Duisburg-Essen, Germany described a new minimally invasive approach to the posterior right liver segments in two patients using retroperitoneoscopic technique (7). The authors described a different and unique approach to traditional laparoscopic surgery for right posterior segments of the liver. In this approach, instead of supine, the patient was placed in prone position with bent hip joints as described for posterior retroperitoneoscopic adrenalectomy. The liver was approached from the right side with trocar position being analogous to the retroperitoneoscopic adrenalectomy. A blunt trocar with inflatable balloon and adjustable sleeve was used. Capnoretroperitoneum was established and maintained with a pressure of 20–25 mmHg. The Gerota's fascia was first opened to reach the retroperitoneal space. The adrenal gland was mobilized cranially to expose the retrohepatic vena cava and the peritoneum. Intraoperative liver ultrasound was then used to locate the liver tumor prior to opening the retrohepatic peritoneum. The liver resection was then undertaken using bipolar energy forceps, Ligasure (Medtronic, Minneapolis, USA) and clips (for vessels larger than 3 mm).

Pringle maneuver was not used. The resected specimen was retrieved using a laparoscopic endobag (Endo Catch Gold, Medtronic, Minneapolis, USA). A drain was left in place. In their report, two patients with right posterior liver tumor undergoing resection using this approach. The operative time was 120 and 180 minutes, respectively. The intraoperative blood loss was less than 100 mL in both cases. Histology confirmed R0 resection margins. The patients were discharged home on postoperative day 3 and 5 without complications.

The author described an alternative technique for hepatic tumor located in posterior right segments using a nontraditional route. This approach has a clear advantage by avoiding transabdominal access in patients who have multiple prior abdominal operations, in whom dense intra-abdominal adhesions are expected. In the modern era of liver resection for metastatic colorectal cancer, many patients undergo repeat hepatectomies for recurrent liver metastases (8-10). In addition to hollow organ adhesions to the abdominal wall, perihepatic adhesions to the right hemidiaphragm are frequently very dense preventing a safe liver resection. Injury to the right diaphragm is common in patients who had prior right hemiliver mobilization(s) for the purpose of hepatic tumor resection/ablation in this area. Therefore, by avoiding transabdominal approach, risk of abdominal organ injury and diaphragmatic injury can both be avoided. In the two patients described in the report, both had undergone multiple abdominal operations (colonic resection and liver resection).

Despite its promising features, potential drawbacks of this approach are anatomical unfamiliarity of retroperitoneal structures by most general/hepatobiliary surgeons and difficulty in performing Pringle maneuver to manage intraoperative liver bleeding. Retroperitoneoscopic approach is used mainly by endocrine or urologic surgeons for adrenalectomy (11-15). Most hepatobiliary surgeons however do not utilize retroperitoneoscopic approach at all, therefore, anatomic identification of important landmarks may not be so simple. Additionally, most hepatobiliary fellowship programs also do not train their trainees to perform retroperitoneal adrenalectomy. The authors have an obvious technical advantage by having an extensive experience using this approach in >2,000 cases of retroperitoneoscopic adrenalectomy during the past 20 years. Such technical expertise in this method is difficult to replicate.

Another major technical concern is related to intraoperative bleeding and theoretical necessity of

conversion to laparotomy which requires positional change to supine. Emergency conversion to laparotomy in supine position for a case of major intraoperative hemorrhage potentially results in an exsanguination and significant morbidity/mortality. The Pringle maneuver is also predictively more difficult to achieve by retroperitoneoscopic approach. This was recognized by the authors in their report. When performed by experienced surgeons, however, even a major bleeding from the vena cava can be controlled by retroperitoneal route. This further underscores the importance of surgeon's familiarity using the retroperitoneoscopic approach.

In conclusions, retroperitoneoscopic liver resection for tumors located in the posterior right segments is a feasible alternative to the transabdominal or transthoracic approach. Adequate familiarity with the retroperitoneal anatomy and experience with retroperitoneoscopic surgery are important to ensure safe application of this technique. This approach adds to the armamentarium of modern liver surgeons and further advances the minimally invasive techniques in liver surgery.

## Acknowledgments

*Funding:* None.

## Footnote

*Provenance and Peer Review:* This article was commissioned by the editorial office, *Laparoscopic Surgery*. The article did not undergo external peer review.

*Conflicts of Interest:* Both authors have completed the ICMJE uniform disclosure form (available at <http://dx.doi.org/10.21037/ls.2020.01.02>). The authors have no conflicts of interest to declare.

*Ethical Statement:* The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

*Open Access Statement:* This is an Open Access article distributed in accordance with the Creative Commons Attribution-NonCommercial-NoDerivs 4.0 International License (CC BY-NC-ND 4.0), which permits the non-commercial replication and distribution of the article with the strict proviso that no changes or edits are made and the

original work is properly cited (including links to both the formal publication through the relevant DOI and the license). See: <https://creativecommons.org/licenses/by-nc-nd/4.0/>.

## References

1. Gagner M, Rheault M, Dubuc J. Laparoscopic partial hepatectomy for liver tumor. *Surg Endosc* 1992;6:99.
2. Fretland ÅA, Dagenborg VJ, Bjørnelv GMW, et al. Laparoscopic Versus Open Resection for Colorectal Liver Metastases: The OSLO-COMET Randomized Controlled Trial. *Ann Surg* 2018;267:199-207.
3. Hüscher CG, Lirici MM, Chiodini S, et al. Current position of advanced laparoscopic surgery of the liver. *J R Coll Surg Edinb* 1997;42:219-25.
4. Araki K, Fuks D, Nomi T, et al. Feasibility of laparoscopic liver resection for caudate lobe: technical strategy and comparative analysis with anteroinferior and posterosuperior segments. *Surg Endosc* 2016;30:4300-6.
5. Casaccia M, Andorno E, Di Domenico S, et al. Laparoscopic resection of hepatocellular carcinoma. Considerations on lesions in the posterosuperior segments of the liver. *Ann Ital Chir* 2012;83:503-8.
6. Cho JY, Han HS, Yoon YS, et al. Feasibility of laparoscopic liver resection for tumors located in the posterosuperior segments of the liver, with a special reference to overcoming current limitations on tumor location. *Surgery* 2008;144:32-8.
7. Alesina PF, Walz MK. A New Minimally Invasive Approach to the Posterior Right Segments of the Liver: Report of the First Two Cases. *J Laparoendosc Adv Surg Tech A* 2019;29:943-8.
8. Wakabayashi T, Abe Y, Itano O, et al. Laparoscopic repeat liver resection after open liver resection: A comparative study from a single-centre. *J Minim Access Surg* 2020;16:59-65.
9. Wakabayashi T, Felli E, Memeo R, et al. Short-term outcomes of laparoscopic repeat liver resection after open liver resection: a systematic review. *Surg Endosc* 2019;33:2083-92.
10. Watanabe G, Mise Y, Ito H, et al. Repeat Hepatectomy for Early Recurrence of Colorectal Liver Metastases- Prognostic Impacts Assessed from the Recurrence Pattern. *World J Surg* 2020;44:268-76.
11. De Crea C, Raffaelli M, D'Amato G, et al. Retroperitoneoscopic adrenalectomy: tips and tricks. *Updates Surg* 2017;69:267-70.
12. Callender GG, Kennamer DL, Grubbs EG, et al. Posterior retroperitoneoscopic adrenalectomy. *Adv Surg* 2009;43:147-57.
13. Perrier ND, Kennamer DL, Bao R, et al. Posterior retroperitoneoscopic adrenalectomy: preferred technique for removal of benign tumors and isolated metastases. *Ann Surg* 2008;248:666-74.
14. Machado MT, Nunes-Silva I, da Costa EF, et al. Laparoendoscopic single-site retroperitoneoscopic adrenalectomy: bilateral step-by-step technique. *Surg Endosc* 2017;31:3351-2.
15. Conzo G, Tartaglia E, Gambardella C, et al. Minimally invasive approach for adrenal lesions: Systematic review of laparoscopic versus retroperitoneoscopic adrenalectomy and assessment of risk factors for complications. *Int J Surg* 2016;28 Suppl 1:S118-23.

doi: 10.21037/ls.2020.01.02

**Cite this article as:** Sucandy I, Rivera-Espineira G. A novel retroperitoneal approach to posterior right segment hepatic tumors. *Laparosc Surg* 2020;4:19.