



ASO AUTHOR REFLECTIONS

## ASO Author Reflections: Glissonian Approach is Useful in Robotic Liver Resections

Marcel Autran Machado, MD, FACS and Fabio Makdissi, MD  
Department of Surgery, Nove de Julho Hospital, São Paulo, Brazil

### Past

Liver resection is the standard procedure for both primary and secondary liver neoplasms. Open liver resection is the gold standard for most procedures and has been performed with increased safety along recent years. However, classic technique involves individual dissection of hilar structures and is useful for right and left hemihepatectomies. Anatomical second or third order resections, sectionectomies or monosegmentectomies are less performed due to the difficulty of control segmental pedicles with hilar dissection.

Glissonian approach is a useful technique to perform anatomical and segmental liver resections and has been subject of several technical reports, including ours.<sup>1-5</sup> Based on small incisions at anatomical landmarks, we described a modification of this technique. This new approach allowed the highly selective control of Glissonian pedicles without hilar or parenchymal dissection with no ultrasound or cholangiography guidance.<sup>4,5</sup> In 2007, we described the Glissonian approach for laparoscopic liver resections.<sup>6,7</sup>

### Present

Advances in laparoscopic devices and increasing experience with minimally invasive surgery resulted in an

exponential increase in the number of laparoscopic liver resections.<sup>8</sup> The robotic platform, with its added degrees of freedom and stability may be useful to perform more complex liver resections. However, the use of the robotic has not spread worldwide and only few centers are using this technique routinely.<sup>9-12</sup> According to some authors, the main reason is the absence of some robotics

instruments that some liver surgeons consider as essential for a safe resection, e.g., CUSA and waterjet.<sup>13</sup> The liver transection technique in robotic surgery is based on the use of bipolar forceps, clamp crush technique or harmonic scalpel. As we already used the technique with bipolar forceps under saline irrigation, the change to the robotic technique did not

### **Future**

Robotic liver surgery has been reported to improve surgeon ergonomics, surgical accuracy due to 3-D visualization and greater range of motion. This approach makes hilar dissection easier with identification and control of individual structures from the hepatoduodenal ligament. However, as in open surgery, this approach has some limitations regarding anatomical segment-based liver resections and most robotic liver resections are major procedures.<sup>13</sup>

Different from open surgery, the minimally invasive complexity is not based solely on the amount of liver removal but also the location of the tumor resection. Therefore, some segments are more difficult to resect. In this setting, the robotic platform may be useful.<sup>14</sup>

impact our technique of parenchymal transection nor our results. Therefore, there is an urgent need for the development of compatible dissection techniques in future robot generations for its common use. Another option is the use of those laparoscopic devices by the bedside surgeon.

Recently, we described the use of Glissonian approach also for robotic liver resection.<sup>15,16</sup> The use of Glissonian approach is useful in patients with previous manipulation of the hepatic hilum and in patients who require anatomical sectionectomy or segmentectomy.<sup>12</sup>

In conclusion, Robotic approach is safe and feasible for liver resections and may be a good indication for complex hepatic procedures and for re-hepatectomy after open or laparoscopic surgery. Glissonian approach is useful for anatomical resection even during robotic liver resection.

### **References**

1. Galperin EI, Karagiulian SR. A new simplified method of selective exposure of hepatic pedicles for controlled hepatectomies. *HPB Surg.* 1989; 1:119–130.
2. Takasaki K, Kobayashi S, Tanaka S, et al. Highly anatomically systematized hepatic resection with Glissonian sheath code transection at the hepatic hilus. *Int Surg.* 1990; 75:73–77.
3. Launois B, Jamieson GG. The posterior intrahepatic approach for hepatectomy or removal of segments of the liver. *Surg Gynecol Obstet.* 1992; 174:155–158.
4. Machado MA, Herman P, Machado MC. A standardized technique for right segmental liver resections. *Arch Surg.* 2003; 138:918–920.

5. Machado MA, Herman P, Machado MC. Anatomical resection of left liver segments. *Arch Surg.* 2004; 139:1346–1349.
6. Machado MA, Makdissi FF, Galvão FH, et al. Intrahepatic Glissonian approach for laparoscopic right segmental liver resections. *Am J Surg.* 2008; 196:e38–e42.
7. Machado MA, Makdissi FF, Surjan RC, et al. Laparoscopic resection of left liver segments using the intrahepatic Glissonian approach. *Surg Endosc.* 2009; 23:2615–2619.
8. Ciria R, Cherqui D, Geller DA, Briceno J, Wakabayashi G. Comparative Shortterm Benefits of Laparoscopic Liver Resection: 9000 Cases and Climbing. *Ann Surg.* 2016;263:761-77.
9. Sucandy I, Giovannetti A, Ross S, Rosemurgy A. Institutional First 100 Case Experience and Outcomes of Robotic Hepatectomy for Liver Tumors. *Am Surg.* 2020 Mar 1;86(3):200-207.
10. D'Hondt M, Devooght A, Willems E, Wicherts D, De Meyere C, Parmentier I, Provoost A, Pottel H, Verslype C. Transition from laparoscopic to robotic liver surgery: clinical outcomes, learning curve effect, and cost-effectiveness. *J Robot Surg.* 2022 Mar 24. doi: 10.1007/s11701-022-01405-w.
11. Machado MAC, Lobo-Filho MM, Mattos BH, Ardengh AO, Makdissi FF. Robotic liver resection. report of the first 50 cases. *Arq Gastroenterol.* 2021 Oct-Dec;58(4):514-519.
12. Machado MA, Mattos BH, Lobo Filho MM, Makdissi FF. Glissonian Approach During Robotic Mesohepatectomy for Recurrent Colorectal Liver Metastasis. *Ann Surg Oncol.* 2022 Dec;29(13):8449-8451.
13. Schmelzle M, Feldbrügge L, Ortiz Galindo SA, Moosburner S, Kästner A, Krenzien F, Benzing C, Biebl M, Öllinger R, Malinka T, Schöning W, Pratschke J. Robotic vs. laparoscopic liver surgery: a single-center analysis of 600 consecutive patients in 6 years. *Surg Endosc.* 2022 Aug;36(8):5854-5862.
14. Machado MA, Mattos BH, Lobo Filho MM, Makdissi FF. Robotic Resection of Postero-Superior Liver Segments (7,8) (with Video). *J Gastrointest Surg.* 2021 Feb;25(2):574-575.
15. Machado MA, Mattos BH, Filho ML, Makdissi F. Intrahepatic Glissonian approach for robotic right hepatectomy. *Surg Oncol.* 2021 Sep;38:101579.
16. Machado MA, Mattos BH, Lobo Filho M, Makdissi F. Intrahepatic Glissonian approach for robotic left hepatectomy. *Surg Oncol.* 2021 Sep;38:101601.